IN TWO SECTIONS—SECTION ONE

THE PAPER INDUSTRY and PAPER WORLD

AN EDUCATIONAL NEWS MAGAZINE—APRIL, 1944

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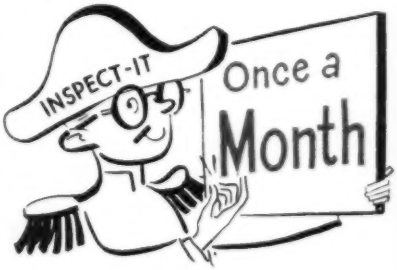

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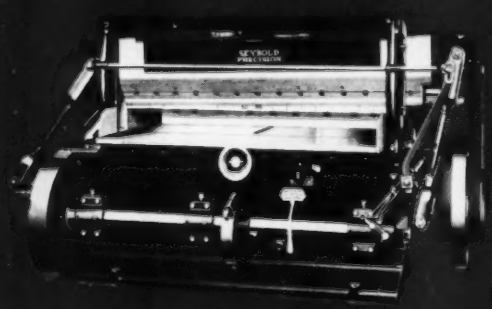

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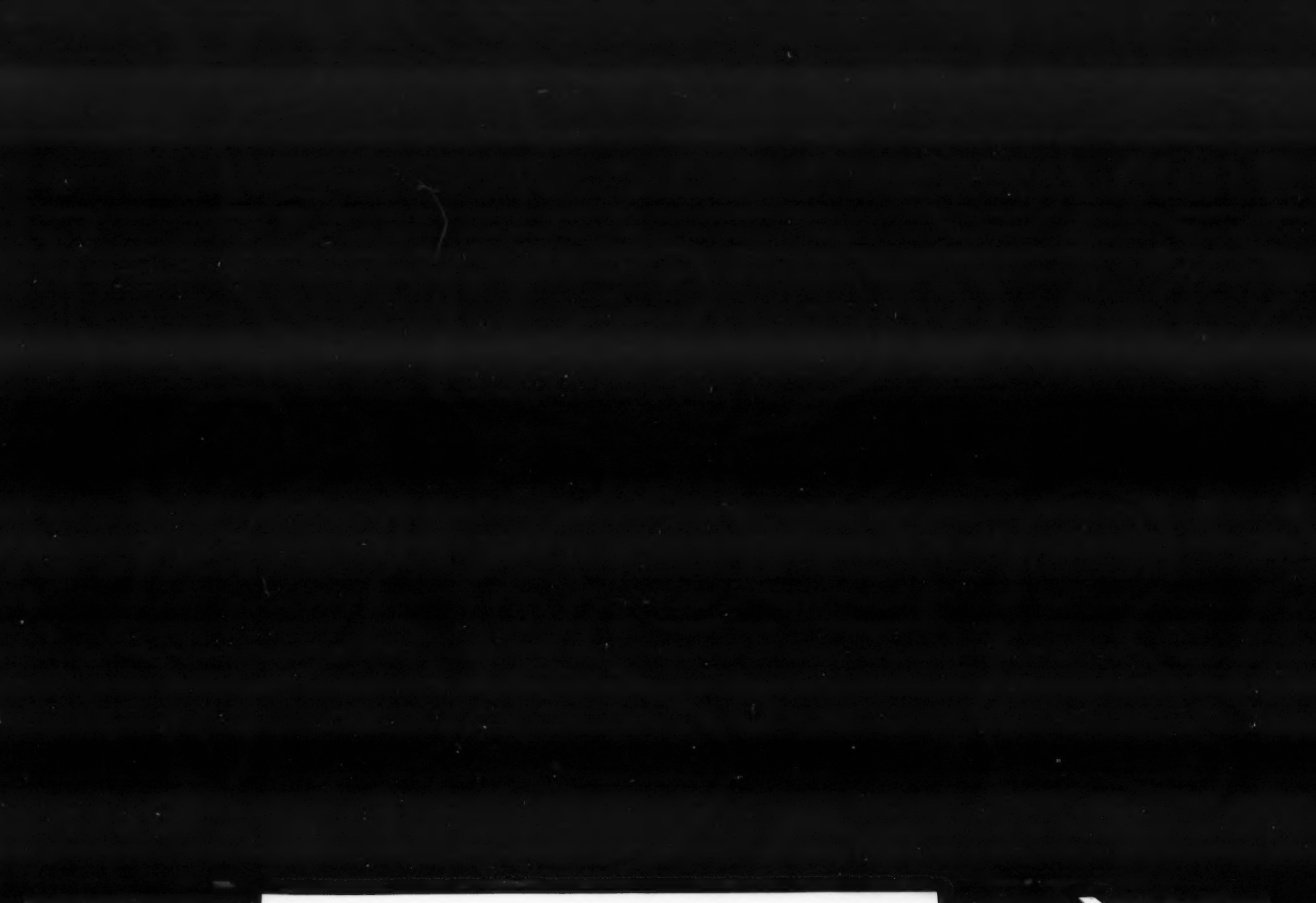

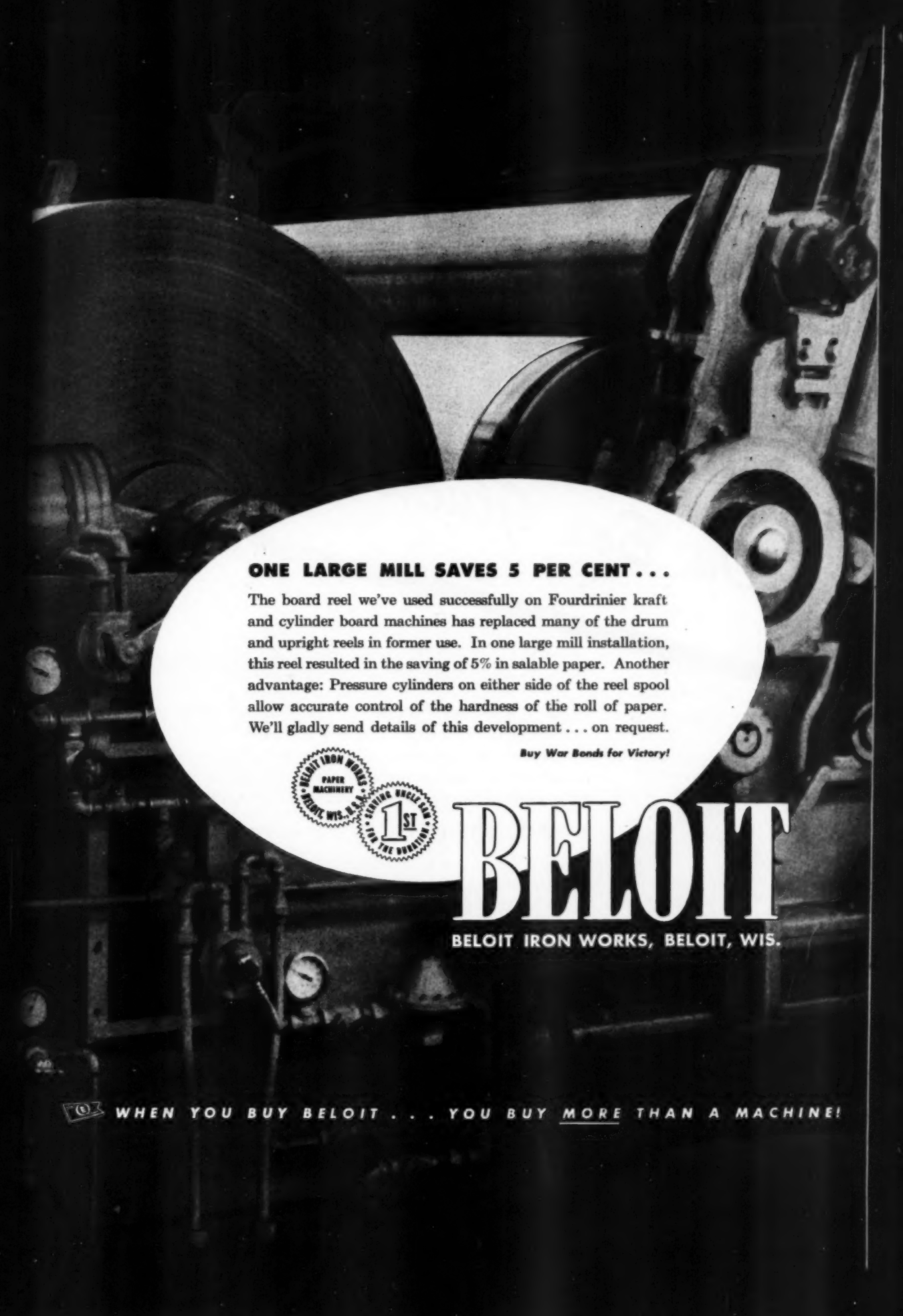

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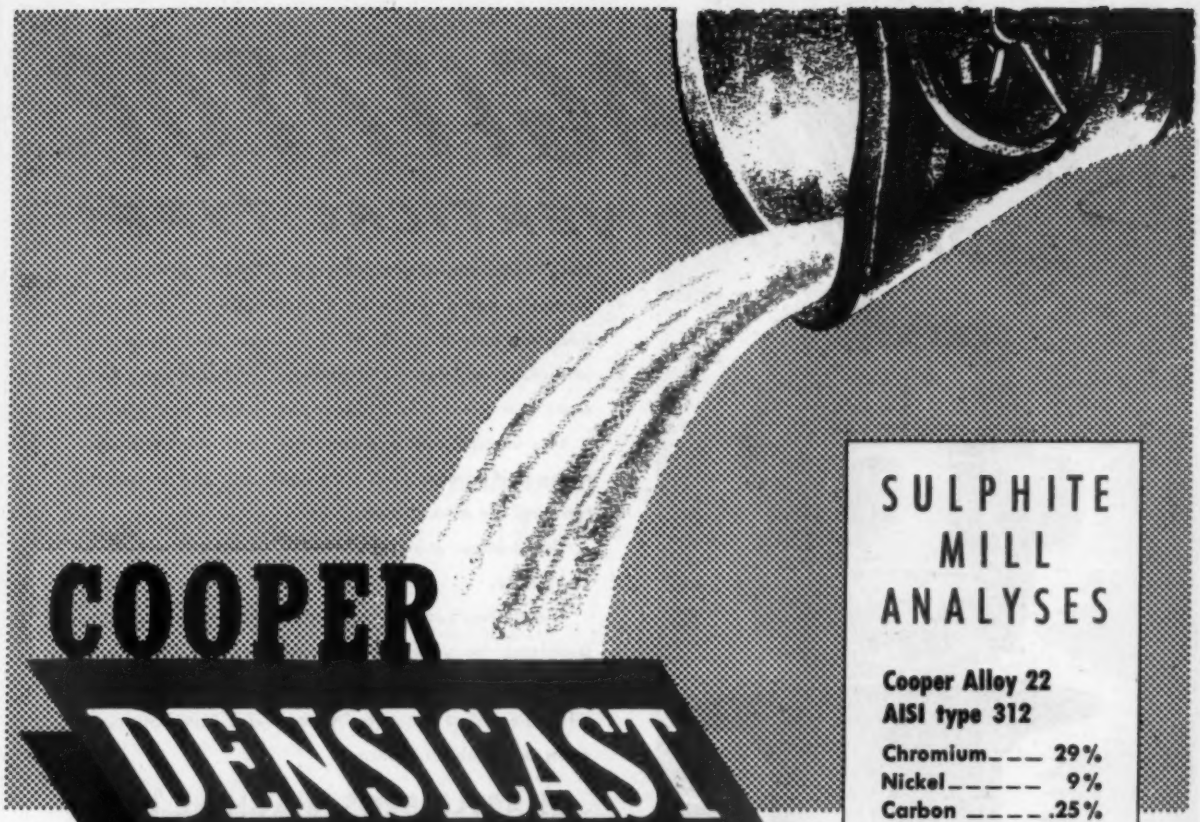

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Superior grain refinement with a resultant denser structure makes Cooper Densicast stainless castings stand up longer in sulphite pulp mill service. They have greater corrosion-resistance and higher physical properties without departing from standard chemical compositions such as AISI — types 312, 316 and 317.

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AISI type 312

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Nickel	9%
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Cooper Alloy 17 SMO
18-8 SMO
AISI type 316

Chromium	18%
Nickel	8%
Molybdenum	3%
Carbon	.10%

AISI type 317

Chromium	19%
Nickel	12%
Molybdenum	3.5%
Carbon	.10%

●

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- Laboratory control over raw materials and finished products.
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Here is something decidedly practical in agitating and pumping equipment—the vertical type agi-flo pump. Requires only 9 sq. ft. of floor space and makes for less cluttered, cleaner basements. Will operate under water—a *life saver* in locations subject to flooding.

This vertical unit performs the same thorough agitating and pumping job obtainable with the horizontal type agi-flo also shown.

The 2-stage job shown below is for use on straw stock only.

Shartle has concentrated on agitating and pumping problems for years. Their engineers are thoroughly qualified to engineer any layout you may require. Give them that opportunity now—for installation, as soon as conditions permit.

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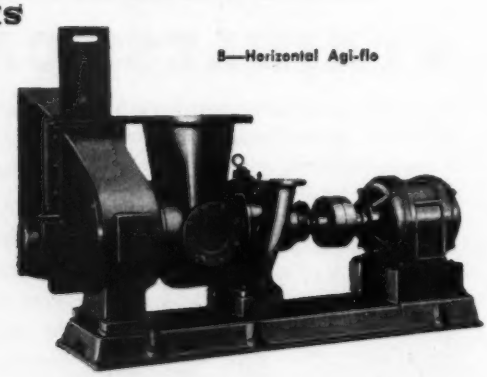
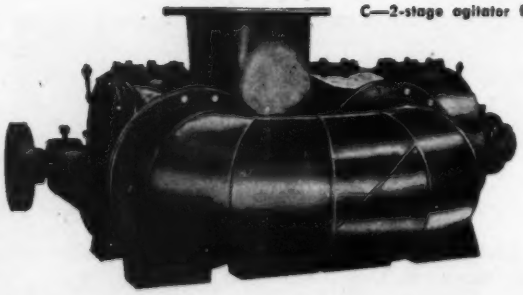
Dilts

B—Horizontal Agi-flo



C—2-stage agitator (for straw)



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THE PAPER INDUSTRY and PAPER WORLD

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VOLUME 26 — APRIL, 1944 — NUMBER 1

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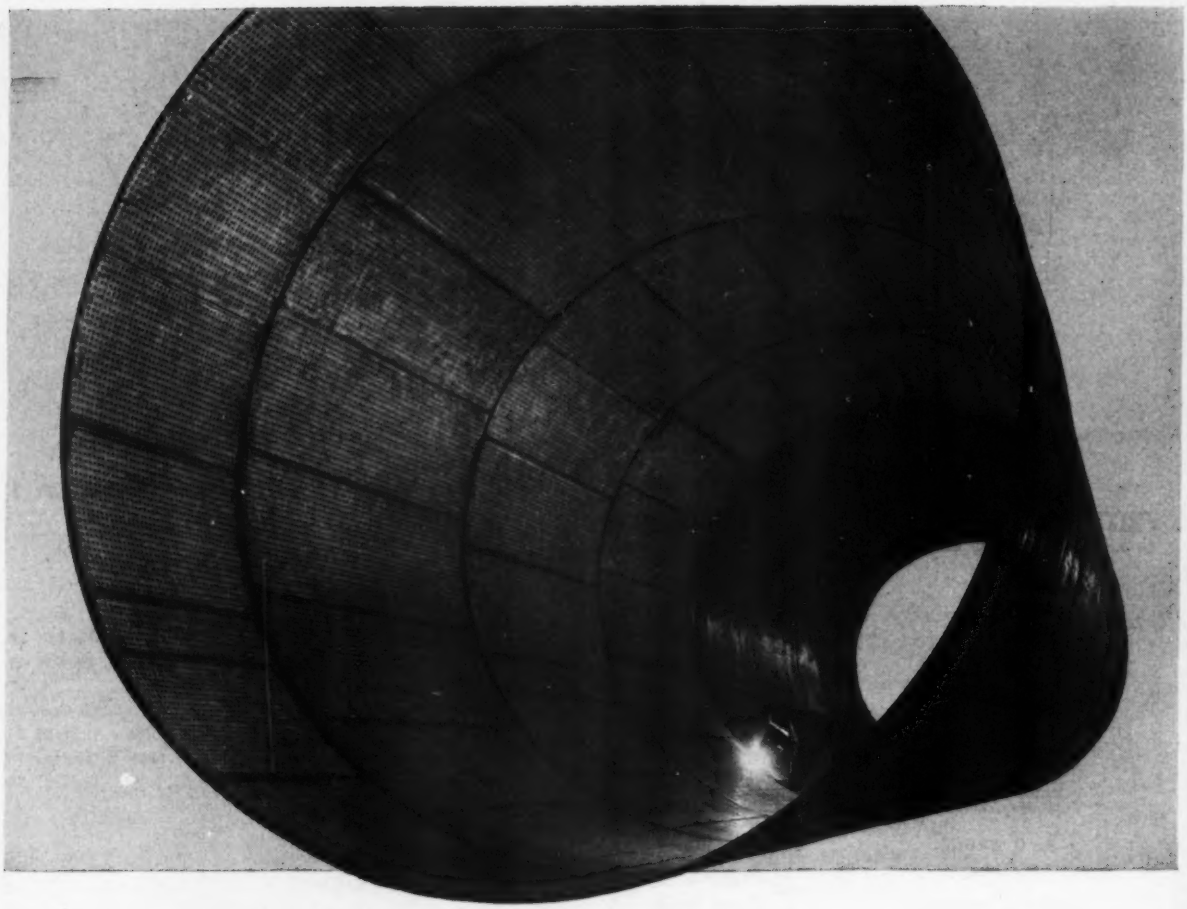

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Despite the fact that we have built more alloy lined pressure vessels than anyone else in the country...we don't have the answer to every corrosion problem at our fingertips. We know that there is no predicting the action of all corrosive materials under all conditions of temperature and pressure. We know also that the ability of many alloys to resist corrosion is changed by the process of fabricating and heat treating.

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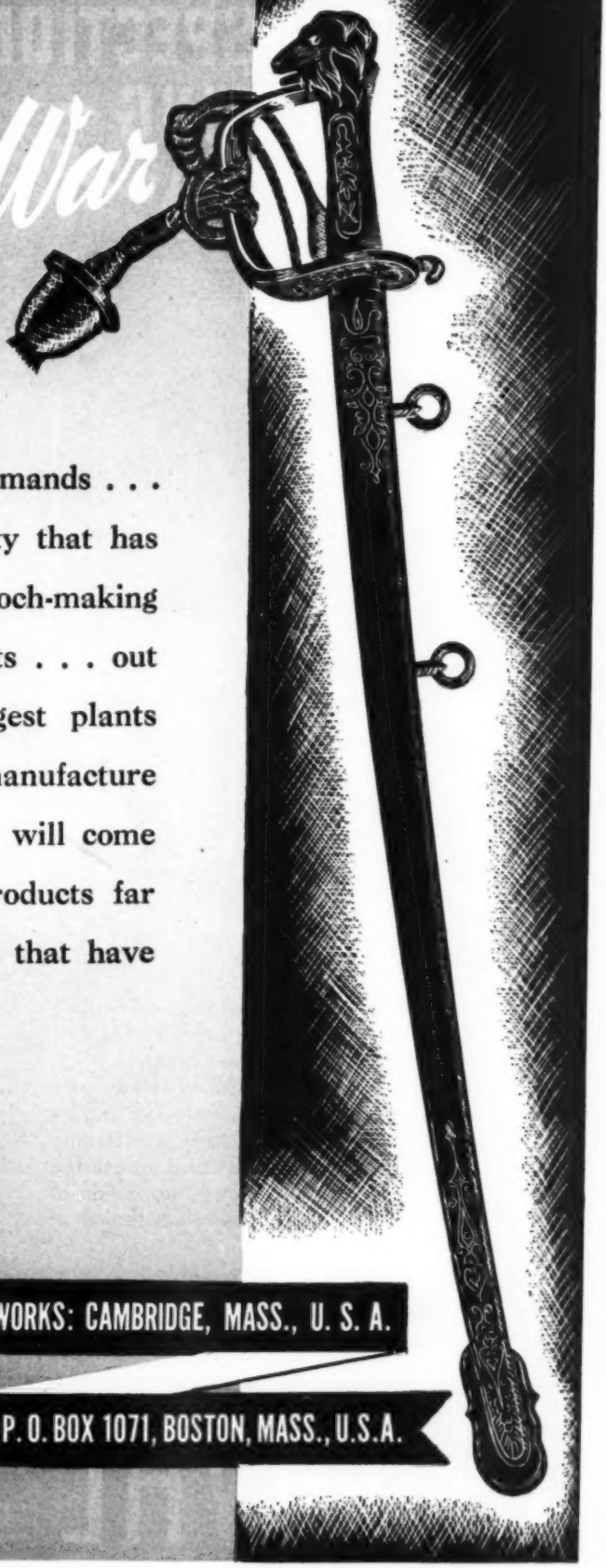
WHEN THE *Sword of War* IS SHEATHED



Out of war's insatiable demands . . . out of experience and ability that has made rubber history in epoch-making inventions and improvements . . . out of one of the world's largest plants devoted exclusively to the manufacture of mechanical rubber goods, will come belting, hose and similar products far surpassing the world's finest that have come so far.

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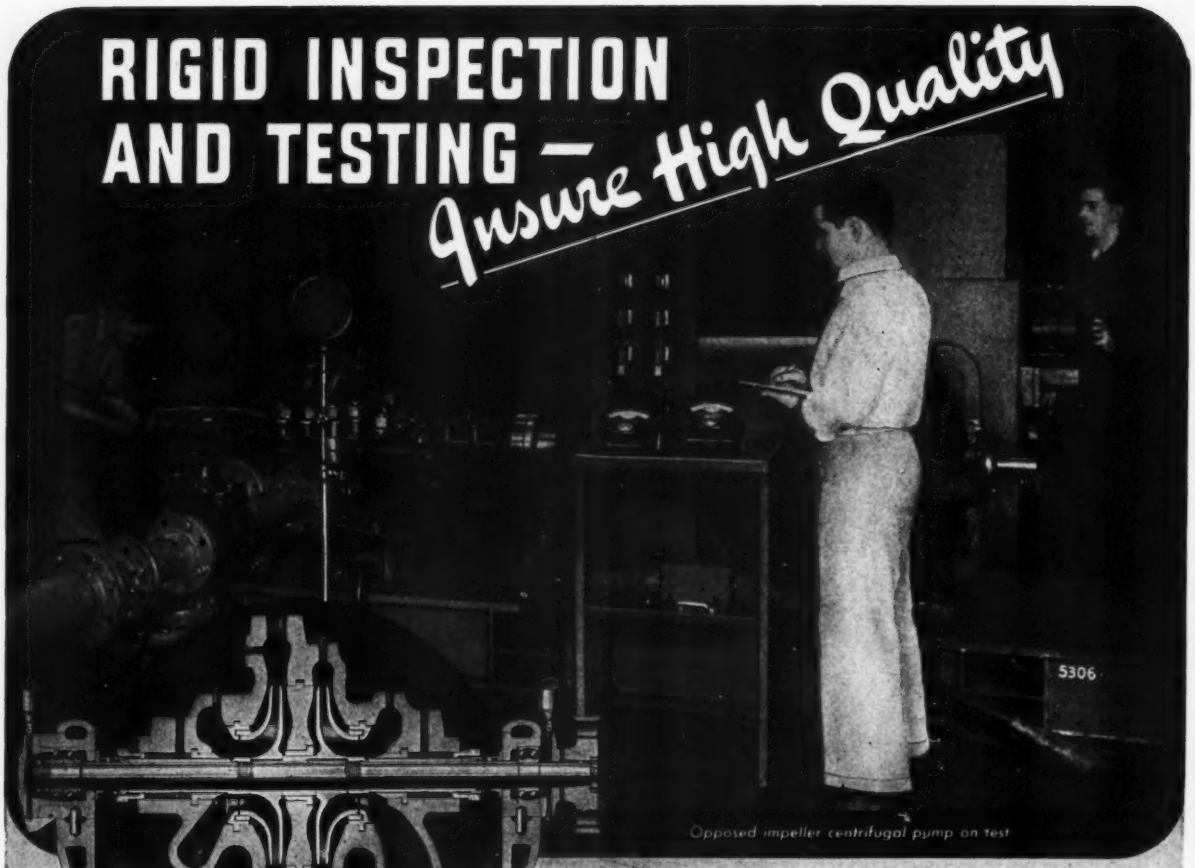
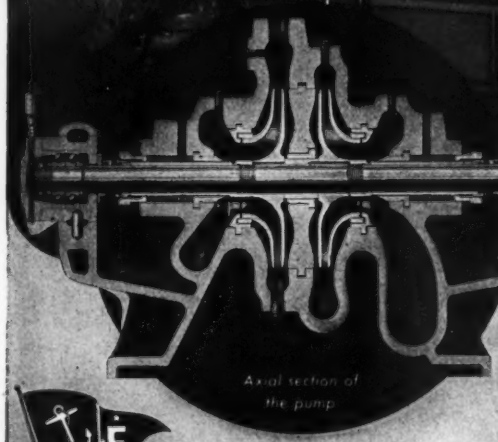


Opposed impeller centrifugal pump on test



Axial section of the pump

The highest quality of engineering design and of workmanship has always been the ideal of the De Laval Steam Turbine Company. High grade machines can be produced only by care in selecting and purchasing materials and by the use of specialized equipment, including precision tools, gages, jigs and measuring devices, followed by limit-gage inspection of finished surfaces and by thorough testing of completed units.

The testing here shown of a two-stage De Laval Pump is typical of the routine testing of De Laval centrifugal pumps. The pump is driven by a calibrated motor and accurate readings are made of speed, pressure, delivery and power consumption over the working range. The unit is then dismantled and all working surfaces are again inspected and checked. In some cases a torsion meter is used for determining input.

A similar procedure is followed with De Laval steam turbines, helical and worm gears, centrifugal compressors, and rotary displacement oil pumps.

The testing equipment includes suitable gages and meters for measuring power and fluids of all kinds and at various pressures and temperatures, also plant for generating steam at high pressure and temperature and for producing high vacuum.

M-34

DE LAVAL *Steam Turbine Co.*
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STOP MOLD BEFORE IT STARTS!

It may seem a contradiction to try to stop an attack before it starts,—but that is precisely what the Dowicides do in combating the costly ravages of mold, decay and termites.

The 17 related Dowicide products are the results of many years' research. Their effectiveness has been proven many times over through successful use in the paper, paint, leather, lumber, and textile fields. Added to these products, Dowicides prevent mold and bacterial growth even under the most severe conditions.

Though the Dowicides are comparatively new products, the paper industry has already learned their value in the many operations where high humidity is present, and mold becomes a costly hazard. Stock, as it comes off the lapping machine, retains a high moisture content, and storage is an open invitation to mold attack. Dowicide G applied as the stock emerges from the machine, defeats mold and protects the pulp quality. Pulp that is held in stock chests is subject to mold growth and souring. Here, the Dowicides not only prevent the mold attack, but also preserve the fibre structure of the pulp. Mold-resistant paper, for uses where moisture will be in contact with the finished paper, can also be produced with the Dowicides. Additional details on many other applications are available on request.

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Dow announces the opening of a Detroit office to serve this important industrial area.

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Additional Dow products for the Paper Industry include: Methocel, Ethocel, Caustic Soda and many other chemicals.

DOW

CHEMICALS INDISPENSABLE
TO INDUSTRY AND VICTORY

"Faith of our Fathers"

The Easter Season this year brought to the people of all Christian nations renewed faith and hope in the eternal victory of life over death, of right over wrong, of light over darkness. Never did Easter mean so much, or the story of the resurrection seem so beatific, so near to our own lives.

In every crisis which this Nation has faced, its leaders and soldiers have stood staunch in the faith of those Christian principles upon which the country was founded and by which it has been preserved. That foundation has remained firm and unshaken by every onslaught, and in the present unparalleled conflict against the armies of blasphemous, idolatrous nations, reports from the war theatre tell how the men of America stand strong in their faith and firm in the belief that in the thickest of the fight they are infinitely strengthened and protected. Many of them carry Bibles from which they draw untold comfort in moments of great need. Hymns rank high in their requests for musical programs from the Home Front.

These valiant soldiers have not forgotten their teachings, and their families and friends at home are comforted by the thought that spiritual guidance goes with our armies in every encounter, and that this power will strengthen and protect them, will give them the Victory that those who put their trust in the right are sure to win.

The Lord is my light and my salvation; whom shall I fear? the Lord is the strength of my life; of whom shall I be afraid? *(27:1)*

Though an host should encamp against me, my heart shall not fear; though war should rise against me, in this will I be confident. *(27:3)*

If I take the wings of the morning and dwell in the uttermost parts of the sea;
Even there shall thy hand lead me and thy right hand shall hold me. *(139:9, 10)*

For in the time of trouble he shall hide me in his pavilion; in the secret of his tabernacle shall he hide me; he shall set me up upon a rock. *(27:5)*

(Selected from the Psalms)

◆

Church Services Held Undersea

Led by Chaplain W. S. Brown (standing, right), crewmen of a U. S. submarine hold Sunday church services under the sea while on war patrol. According to the Navy, this is believed to be the first such service, since U-boats do not usually carry chaplains. Chaplain Brown, formerly of St. Paul's Episcopal Church, Toledo, Ohio, was a passenger on the way to a new station in the South Pacific. ***(Press Association photo.)***

TRADE WINDS

★ ★ ★

U. S. Survey Shows that Most Pulpwood Products Go to War

▶▶▶ INFORMATION has just been released by the War Activities Committee of the Pulpwood Consuming Industries, proving that more than two-thirds of America's pulpwood goes either directly to War or into Home Front activities which are necessary to support a War economy. This information is the result of a survey just completed by the WPB Forest Products Bureau and the Department of Commerce Pulp and Paper Unit.

While citing the overlapping of military and civilian uses of paper and paperboard, the survey classified the end uses of pulpwood into three groups as follows:

Class 1—Used directly by Governmental agencies and war plants for war purposes; 35.8 per cent.

Class 2—Used to maintain a war economy on the Home Front; 32.9 per cent.

Class 3—Used to maintain a civilian economy; 31.3 per cent.

Farmers, as the second largest users of pulpwood products, are included in the Class 2 group of essential Home Front users of paper and paperboard.

Also included in Class 2 are newspapers and periodicals although the report points out that most newsprint comes from Canada and the survey deals only with consumption of domestic pulpwood.

Newspapers and periodicals, the Department of Commerce document stated, "play a major role and predominantly support the war economy. The tonnage they use is relatively small in terms of total United States production of paper and consumption of pulp. Newspapers and periodicals combined consume about 7.5 per cent of the total production of paper and paperboard and 10.9 per cent of the total consumption of pulp."

More than 68 per cent of the container board made of pulpwood goes directly into war uses and an additional 11.5 per cent into essential Home Front industry. Thus only 20.3 per cent of this important type of pulpwood product is consumed for civilian uses, according to the survey.

Some paper and paperboard specialties, many of them developed to meet wartime needs, are all-out for war. For instance, 82.4 per cent of the container board and jute liner used in V-boxes are in Class 1. In the same war-use group 85.8 per cent of the kraft liner, 82.7 per cent of the B-box chip liner, and 62.5 per cent of resin impregnated paper.

Almost 99 per cent of the map and chart paper made in this country goes directly to war as does 72.6 per cent of the asphalt and creping paper.

Oddly enough, 61.1 per cent of the fine bond and writing papers are used by the armed services, Governmental agencies and war plants for war purposes. Another 17.8 per cent is consumed on the Home Front "to maintain a war economy." Only 23 per cent goes to civilian industry.

Over half of the building board paper is used directly for war and another 41 per cent for wartime industry, leaving but 6.5 per cent for civilian use.

Absorbent paper is divided thus: for war 52.2 per cent; for the Home Front, 17.6 per cent; and for civilian use, 30.2 per cent. Only a few items, such as sanitary and tissue papers, are still predominantly for civilian use although they, too, have large war-use consumptions. Over half of the paper towels, which is a sanitary paper, is used directly for war.

INSTITUTE AWARDS DEGREES

▶▶▶ The doctor of philosophy degree, the highest in academic achievement, was awarded to five graduates of the Institute of Paper Chemistry by Lawrence College at commencement exercises held March 27 in Appleton, Wisconsin. The honorary doctor of science degree was conferred upon Dr. Clifford B. Purves, professor of industrial and cellulose chemistry at McGill University, Montreal, Canada. Dr. Purves was the commencement speaker.

The commencement, the 14th since the founding of the Institute in 1929 but the first held at a time other than in conjunction with the Lawrence College exercises, carried all of the dignity and tradition of the former affairs and was preceded by the academic procession made up of the faculties of both the college and the graduate school, the trustees, and the graduates.

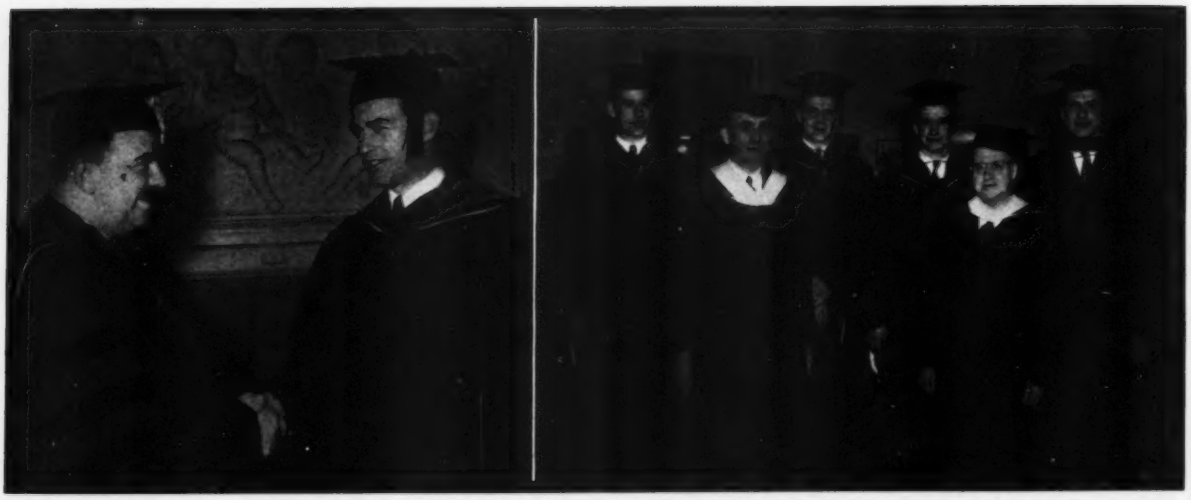
The degrees were conferred by Ralph J. Watts, acting president of the college, to the candidates who were presented by Harry F. Lewis, dean of the Institute. Professor Arthur Weston of the college and Dr. Otto Kress of the Institute placed the hoods on the graduates as each was presented for his diploma.

The candidates, which brought to 82 the number of men having received the doctor of philosophy degree, and the titles of their theses were:

Charles Manly Sigvardt, Great Falls, Montana, "The Influence of Methylation Treatments on the Behavior of Paper Fibers towards Basic Dyes. A Contribution to the Mechanism of Dyeing."

Berwyn Brainerd Thomas, Tucson, Arizona, "The Preparation of Aspen Holocellulose and a Chemical Study of Its Fractions."

Jack J. Yirak, Omaha, Nebraska, "A Study of the Colloidal Behavior of a Fractionated Mannogalactan from the Carob Seed as Observed by Viscosity Measurements."



LEFT—Westbrook Steele, executive director of the Institute of Paper Chemistry, congratulates Charles M. Sigvardt, who this year was awarded the Westbrook Steele Medal for presenting the most outstanding thesis of the candidates for the doctor of philosophy degree. RIGHT—Graduates of the Institute are shown with Dr. Clifford Burrough Purves, who was given honorary doctor of science degree (front, left) and President Ralph J. Watts, who conferred the degrees. Back Row (L to R)—Charles Manly Sigvardt, Berwyn Brainerd Thomas, Jack J. Yirak, and Victor Simon Burstein. (Joseph Way Shimp, now an ensign in the Navy was awarded degree of doctor of philosophy in absentia.

Victor Simon Burstein, Neenah, Wisconsin, "A Method for Ascertaining the Rate of Drying of Paper and Paperboard under Machine Conditions."

Joseph Way Shimp, Philadelphia, "The Distribution of Sulphur throughout the Wool Structure and the Effect of Dilute Alkali on that Distribution." (This graduate is now an ensign in the Navy and the degree was awarded in absentia.)

The Westbrook Steele medal, awarded each year to that graduate who presents the best thesis, went to Mr. Sigvardt. The donor of the medal is Westbrook Steele, executive director of the Institute.

In his address to the graduates, Dr. Purves, who is considered the foremost man in the field of cellulose chemistry, presented a highly technical discourse entitled "Reactivity of the Different Types of Hydroxyl Groups in Cellulose." In this he traced research and reaction thus far but ended by saying that the future of cellulose belongs to the young men such as the new graduates he was facing.

In presenting Dr. Purves for the honorary degree Dr. Lewis stated—"Mr. President: I have the honor to present Clifford Burrough Purves, teacher, research worker, friend, to receive at your hand the degree of Doctor of Science, *honoris causa*. Born in Scotland, and educated at St. Andrew's University, he has served on the faculties of Marischal College, Scotland, and the Massachusetts Institute of Technology, and on the research staff of the National Institute of Health. He has recently been called by McGill University to serve as the E. B. Eddy Professor of Industrial and Cellulose Chemistry, and has been placed in charge of the Division of Industrial and Cellulose Chemistry of the Pulp and Paper Research Institute of Canada. I ask you to confer upon him this degree."

In conferring the degree on the distinguished visitor, President Watts said: "Clifford B. Purves, scientist, teacher, and administrator, for many years in research laboratory and classroom you have typified the good life; modest and scholarly, you have achieved warm relations with staff and students, deeply satisfying and inspiring to both. You are known among investigators of the carbohydrates and cellulose for your outstanding accomplishments in their difficult fields of research. We are delighted to honor you for these achievements and extend to you our confident wishes as you carry on in your enlarged responsibilities in the great university of our sister country."

Miss Shirlee Emmons, mezzo-soprano, a recent Lawrence College graduate, sang three solos. She was accompanied by Miss Dorothy Villa. The invocation and benediction were given by Dr. Thomas S. Kepler, professor of Bible and Religion.

The hall was comfortably filled with relatives and friends of the graduates. On the platform were Dr. Kepler, Dr. Lewis, Deans Carl J. Waterman and Paul Anderson, President Watts, Dr. Purves, Mr. Steele, Dr. Kress, Mr. Ernest Mahler, and Professor Weston.

JOHN STRANGE REVIEWS HISTORY OF INSTITUTE'S 14 YEARS OF RESEARCH

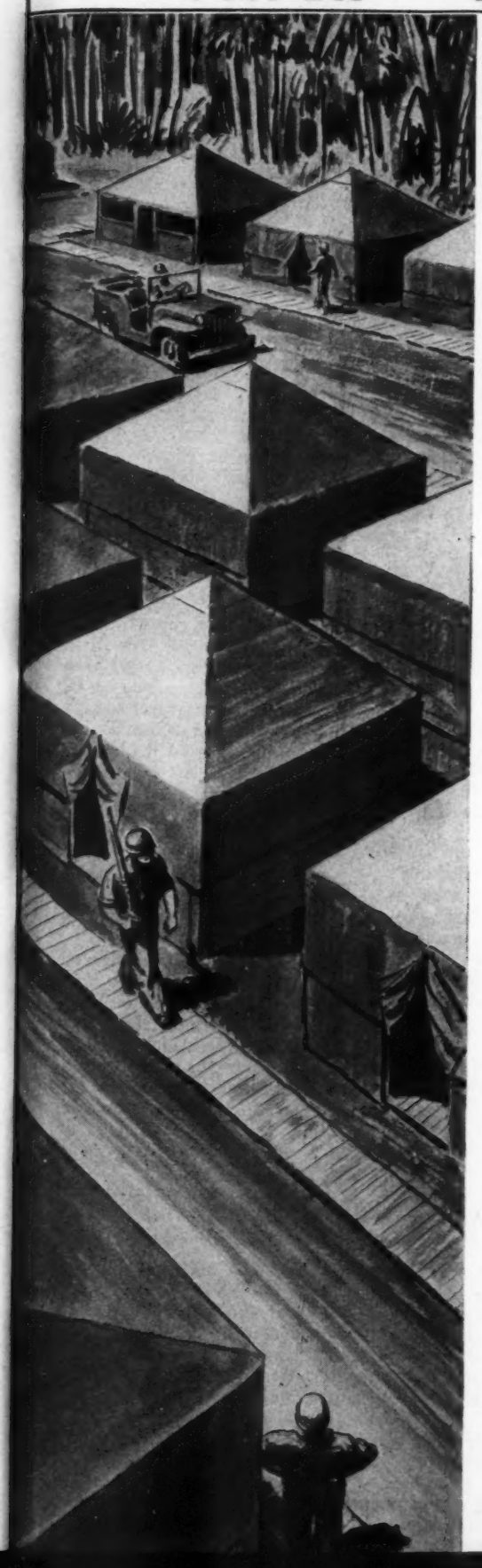
The Institute of Paper Chemistry was started 14 years ago last month backed by 19 mills and a budget of $40,000, John Strange, secretary-treasurer, told members of the Appleton, Wisconsin, Rotary Club at a meeting March 28. Today there are over 100 corporations with a total of 400 plants backing the Institute, with a yearly operating budget of approximately $500,000 a year.

The Institute is the first and most significant alliance of education, research, and industry in the entire commercial field, and it has been an outstanding contributor to that new profession which has created the industrial scientist.

After Mr. Strange gave a brief history of the development of the Institute, which is a graduate school affiliated with Lawrence College, he told of the distribution of the 218 men who have left the institution. Many are in key industrial positions within the paper industry and a good many are in military service. Thirty-eight members of the staff of 150 have left for war service, but replacements have thus far enabled a full staff to be maintained.

As to what the Institute is doing now the speaker stated that its research is largely tied up with the war effort

PAPER · · · America's 6th Industry



COOLED BY PAPER . . .

(NEWS ITEM: *Paper is now being used to insulate huts that house our Armed Forces.*)

From Alaska to Guadalcanal, paper is being used to insulate huts that house our Armed Forces. Special paper manufacturing treatments give paper the necessary properties to keep out excessive cold and heat.

Paper in place of wood, paper in place of metals, paper in place of fabrics, paper in place of hides . . . New uses for paper, calling for new standards of lightness and toughness; new standards of quality in performance . . . New responsibilities—new opportunities for the Pulp and Paper Industry.

Puseyjones men and production facilities are at War—and Industry at War is Industry thinking and working at hitherto unheard of speeds. Our Research and Development Committee, working on the problems of America at War, is finding many practical and technical advantages that will be of incalculable value to America at peace—to the Paper Making Machinery of the future.

Puseyjones engineers will welcome the opportunity to work with you in your Post-War Planning. We have prepared three informative articles, "The Post-War Fourdrinier," "Development of Stream-Flow Vat System," "The Flow Spreader." Ask for reprints by name.

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and a goodly percentage of this cannot be talked about. Much of the work is toward the alleviation of the severe paper shortage. This is being attempted by improving papers and by finding substitute fibers.

It was formerly believed that most paper was used for printing or writing, but by far the greatest tonnage is used for service or mechanical functions, the speaker pointed out. Paper is now considered the number one raw material, and of 700,000 articles used in the war, 90 per cent are packaged in paper. Paper also is used directly in the construction of many articles of war.

The Institute has expended over 30,000 man-hours in testing work for the quartermaster corps alone. Not only have the papers for packaging been tested, but foods in the containers are constantly being subjected to all kinds of tests. The industry has developed a paper box that can be packed and thrown overboard into shallow water and picked up three days later without showing any damage to contents. This and other similar developments have been of great service to the military forces, whose supplies are subjected to all kinds of adverse conditions.

The Institute is also doing research on many things that are related to the paper industry. Much work has been done in plastics and in paper based materials. Bacteriology has also become an enlarged field of study, and research in all fields related to the industry is constantly being developed by the staff. This is being done under a twofold purpose. The first to provide the member mills with the latest discoveries, and the second is the knowledge that research vitalizes teaching. When the faculty is constantly engaged partially in research, the students are given instruction by active minds.

Mr. Strange closed by pointing out that the industry is going to need more than ever a supply of outstanding leaders following the War. He stated also that the Institute is at present attempting to make plans to aid in the rehabilitation of a certain number of war veterans.

★ ★ Washington News ★ ★

DEVIATION FROM ITS PAPER SPECIFICATIONS TO BE ALLOWED BY GOVT.

A letter giving authority to deviate from federal specifications [illegible] and paper products has been sent to the heads of all departments and establishments by Clifton E. Mack, director of procurement of the U. S. Treasury Department. The text of the letter follows:

"The Deputy Director Procurement Policy Division, War Production Board, has advised that because of the critical condition of the supply of wood pulp in the United States, it has become necessary for many of the paper manufacturers to use low-grade fibrous materials, such as waste papers and ground wood pulp, in the manufacture of fine papers in which such materials have not hitherto been used.

"The situation is so critical that difficulty is being experienced by Government agencies in securing adequate coverage of paper requirements when purchases are made on the basis of the present Federal Specifications for paper and paper products, as it is generally impossible for manufacturers using the low-grade fibrous materials to produce papers and paper products that will comply with the specifications. The supply of the fibrous raw materials is so variable from day to day that it is impossible for [illegible] possible to keep in step with the rapidly changing conditions by [illegible] in the Federal Specifications. In order to meet this situation, [illegible] hereby authorized to permit deviation from the Federal Specifications whenever this becomes necessary for the above reason, by insertion of the following or equivalent language in your invitations for bids for paper and paper products:

" 'If a prospective bidder is unable because of the critical condition of paper making materials to furnish a product complying with the applicable Federal Specifications, consideration will be given to a bid for supplying an alternate product, provided, (1) that he states in what respect his product will deviate from the requirements of the specification; (2) that he submits a sample of his current product with his bid; and (3) if at the time of manufacture, pulp allocation or supply of other materials will further adversely affect the quality of the bidder's product, he will notify the procurement office of such fact, either for approval or rejection of the quality to be supplied.'

"This authorization does not apply to technical papers such as blue print paper, map paper, perforator teletype paper, recording instrument chart paper, tracing paper, and such papers of related natures that may be construed as technical papers.

"Federal Specifications for paper and paper products will be kept as nearly in accord with the changing conditions of supply as is possible, either by amendment or revision."

CIVILIANS NEEDS FOR BIBLES AND TEXTBOOKS WILL BE MET IN 1944

Textbooks and Bibles will be available in sufficient quantities during 1944 to meet all essential civilian needs, Donald M. Nelson, chairman of the WPB, recently stated in answer to inquiries concerning the impact of the paper shortage on production of such books during the present year.

The Printing and Publishing Division of WPB points out that if local governments and Boards of Education would scale down their textbook specifications, publishers would be in a position to produce more books from a fixed amount of paper. The occasional shortage of Bibles at book stores must be blamed upon the lack of highly skilled manpower required to print and bind them, rather than upon inadequate paper supplies. If, however, it should appear that a shortage of textbooks and Bibles is imminent, remedial steps will be taken by the WPB.

WAKEMAN AND BOYCE RESIGN FROM THE WPB

Announcement is made of the resignation of A. G. Wakeman and Charles W. Boyce, who have been members of the WPB organization since early in its history.

Mr. Wakeman was formerly director of the Pulp and Paper Division prior to the organization of the Forest Products Bureau last November. Since then he has served as assistant to Harold Boeschenstein, director of the Bureau. Mr. Wakeman will return to the Fox River Paper Corporation, Appleton, Wisconsin, where he was operating manager, prior to his connections with the WPB.

Mr. Boyce has been special assistant to the director of the Paper Division. He has not announced his future plans.

▶▶▶ FURTHER STEPS toward reorganizing the Forest Products Bureau of the War Production Board have brought some more outstanding paper manufacturers into the Government service. Henry G. Boon, formerly in charge of the Fine Paper Branch, has been promoted to be assistant to Rex W. Hovey, who heads the entire paper division, and he has been succeeded by

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MORE BOARD FEET PER MINUTE

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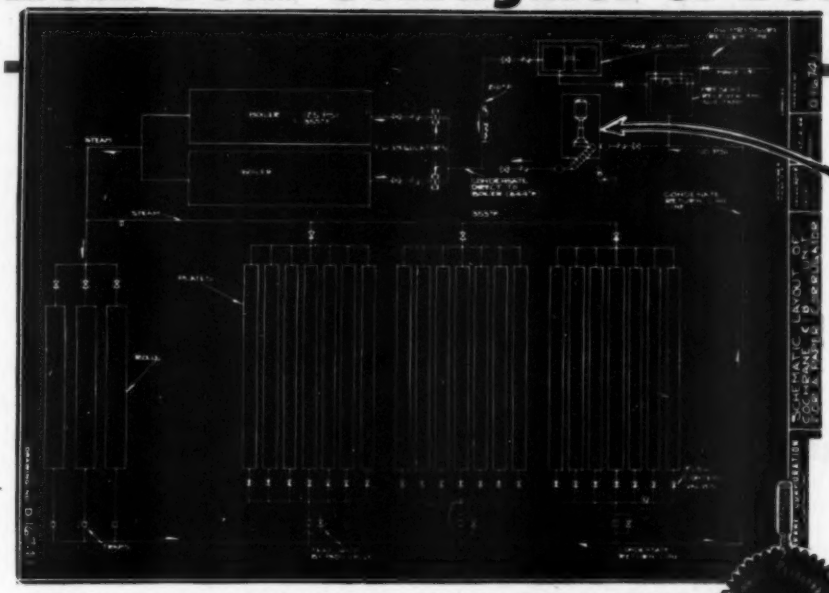

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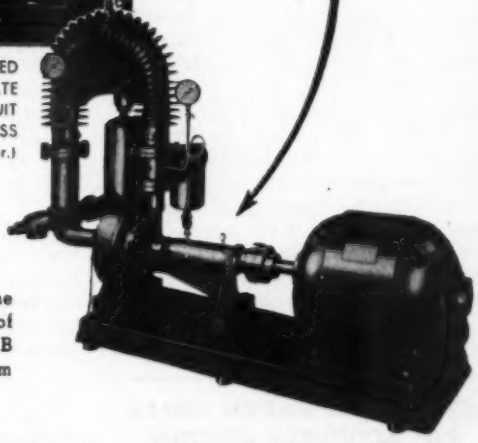
THE SCHEMATIC PLAN ABOVE SHOWS HOW THE C-B CLOSED SYSTEM IS INTERPOSED ON A PRESENT OPEN SYSTEM PRODUCING POSITIVE DRAINAGE OF CONDENSATE AND AIR FROM EQUIPMENT — AUTOMATIC ELIMINATION OF AIR FROM CIRCUIT AND DIRECT RETURN TO THE BOILER WITH LESS THAN 10° TEMPERATURE LOSS (Note temperature readings from boiler through equipment and back to boiler.)



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The C-B System of High Pressure Condensate Return combines better condensate drainage with high temperature return to the boiler. Units now operating in typical plants are increasing surface temperatures on rolls and plates as much as 30°. Fuel costs are reduced from 12% to 15%. Boiler pressures remain constant, make-up requirements are reduced.

NO PIPE CHANGES ARE REQUIRED—other than connections into existing closed circuit.

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COCHRANE C-B SYSTEM

CONDENSATE RETURNED TO BOILERS AT HIGH PRESSURE AND HIGH TEMPERATURE

William H. Kenety of the Fitchburg Paper Company. Ross F. Herrlinger has been brought in to head the Converted Paper Products Branch; George K. Ferguson of the Watervliet Paper Company, will head the Book Paper Section of the Fine Paper Branch, and Paul M. Beach, of the Regal Paper Corporation, will be chief of the Glassine and Greaseproof Paper Section. Edwin P. Jaeckel has been named chief of the Waterproof Paper Section of Mr. Herrlinger's branch.

▶▶▶ HIS COMPANY HAS RELEASED Kenneth Trowbridge to go to WPB where he will assist James Madden, deputy director in charge of pulpwood production branch of the Paper Division. Mr. Trowbridge is an experienced forester; he has been connected with the Brunswick Pulp and Paper Company, Brunswick, Georgia, for the past six years.

WPB MAY EXTEND ORDER TO COVER PAPERBOARD

Although there is a slight touch of optimism in Washington quarters as to the future paper situation (due to receipts of pulpwood during January and February in material excess over receipts in those months a year ago) the War Production Board is finding some serious problems in the paperboard field. The demand for containers for shipping war materials is so intensive that 100 per cent of the entire container board production is reserved subject to WPB orders. The entire output is subject to allocation, and no civilian orders can be accepted without WPB authorization. While this rule only applies to container board, it is possible that the principle may be expanded to cover all paperboard.

Condenser tissue is also on a 100 per cent reservation basis, and reserves on other papers have been somewhat increased during the month. As one step toward relieving the situation, arrangements have been made for producers of container board to exchange orders to avoid unnecessary transportation and expedited deliveries.

▶▶▶ G. G. COBEAN has been elected President of the United States Paper Exporters' Council. In accepting the election Mr. Cobean said he was looking forward to the time when American made papers will be a more important factor in world markets than ever before.

▶▶▶ THE OFFICE OF Price Administration has taken action to encourage the cutting of pulpwood by orders, raising the ceilings in several important zones. Increased ceilings ranging up to $1.10 per cord have been authorized in the southern pine belt, and up to $2.75 per cord increases have been authorized in the northeastern states.

▶▶▶ BECAUSE ROTH F. HERRLINGER has been assigned to service on the War Production Board, he has resigned as President of the Gummed Industries Association, and been succeeded by John MacLaurin, who in turn was succeeded as vice president by J. A. Shartle.

▶▶▶ PAUL J. WHITE, of New York, has been elected President of the National Association of Waste Material Dealers, at which convention the lid was taken off the black market situation in the waste paper industry.

MARATHON PAPER MILLS CO. ACQUIRES HOSKIN PLANT AT MENOMINEE

A late announcement by the Marathon Paper Mills Company, Rothschild, Wisconsin, marks another step in its growth and expansion. Elsewhere in this section appears an item giving details of the important project now going into construction for its Canadian affiliated company.

The Marathon company's latest acquisition is the plant of the Hoskin Paper Company, Menominee, Michigan, which was effective April 1. The Hoskin company's existing sales and purchase contracts are assumed by Marathon, subject only to government regulation. The mill now will be known as the Menominee Division of Marathon Paper Mills Company, and R. A. Hoskin, president and general manager of the Hoskin company is retained as resident manager of the mill.

Operation of the plant will continue as heretofore except such changes in manufacturing and sales policy as shall be made necessary by future government directives.

◆

WISCONSIN HAS 25-YR. PLAN FOR REFORESTATION

Organization of Trees for Tomorrow, Inc., by a group of Wisconsin's leading paper mills marks the first step toward a 25-year reforestation program involving five million acres of cut-over land.

Believed to be the first of its kind, the corporation is headed by Folke Becker, president of the Rhinelander Paper Company of Rhinelander, Wisconsin. The first five-year phase of the program is backed by approximately $250,000.

Working hand in hand with the State Conservation Department, the University of Wisconsin College of Agriculture, the State Department of Public Instruction and the Forest Extension Service, Trees for Tomorrow, Inc., will encourage expansion of tree planting on farmers' woodlots and on school forest tracts through 4-H clubs and civic organizations. It is not intended to supplant individual reforestation programs of the mills.

Through reforestation, the organization hopes to achieve for Northern Wisconsin greatly increased water conservation, control of soil erosion and floods, added recreational opportunities, and a postwar employment reservoir.

◆

MARATHON TO START WORK ON CANADIAN PLANT AND TOWN

It is now announced that the Canadian affiliate of Marathon Paper Mills Company, Rothschild, Wisconsin, is ready to begin construction on the bleached sulphate mill which was first announced the latter part of 1943 (Cf. P. I. & P. W., Nov., 1943, p. 848).

John J. Stevens, Jr., executive vice president of Marathon Paper Mills of Canada, Ltd., and in charge of Canadian operations, has made the announcement that this project will include a program to cost approximately $10,000,000, including the mill which is being planned to produce 90,000 tons of bleached sulphate pulp annually, and which it is expected will take 18 months to complete. Work will be started immediately.

The plan includes, in addition to the mill, a completely new modern-type town with all advantages such as hospital, postoffice, bank, stores, dry cleaning and laundry, theater and recreation facilities and other modern conveniences. Mr. Stevens has stated that the town will be a "closed town" in that all buildings will be owned by the company, but it is probable that franchises will be granted for the carrying on of certain businesses.

The town has not yet been named, but it will be located near Peninsula, across Lake Superior from Ontonagon, Michigan, and about 250 miles northeast of Ashland, Wisconsin.

The mill and equipment have been designed by the company's engineering staff. The mill will be windowless, and modern in every way. Present plans point to the production of approximately one-third more pulp than the company's requirements. This

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HERCULES POWDER COMPANY

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SUPERIOR PMC CHEMICALS

PI-40

DETROIT PUBLIC LIBRARY

The Quarter Century Club of the Menasha Products Division of the Marathon Paper Mills listens to D. Clark Everest (shown at left), president and general manager of the parent company. Shown at Mr. Everest's left are: Leo Croy, vice president of Marathon Paper Mills Co.; Mrs. Jacob Rausch; Charles F. Mason, holder of the longest service record; and Mrs. Mason.

additional pulp will be sold to other paper companies. It is thought that approximately 600 men will be employed on the project this year; that eventually this figure will increase to 1,500 in the mill and timber operations.

◆

FORESTRY COMMITTEE MEETS TO PLAN WIS. FOREST CONSERVATION

Plans for forest conservation on a long range basis were put into motion when paper mills within the tri-city area were represented at a meeting of the Wisconsin Division of the Forest Industries Information Committee held in Wausau, on Monday, March 27.

Meeting with Fred G. Wilson, superintendent of co-operative forestry of the Wisconsin Conservation Department were members of the committee, which includes from this area, F. G. Kilp, Nekoosa-Edwards Paper Company, and E. B. Hurst, of Consolidated Water Power and Paper Company. Chairman of the group is Folke Becker, president of the Rhinelander Paper Company.

Under a plan sponsored by the committee and discussed recently with Mr. Wilson, the State Conservation Department would certify commercial timber tracts as "industrial forests" when high management standards result in optimum timber re-growth conditions. It is expected that recognition of outstanding Wisconsin commercial forest areas will result in increased expansion of private forestry among state timber owners.

25-YR. CLUB STARTED AT MENASHA PRODUCTS CO. WITH 95 MEMBERS

The Quarter Century Club of the Menasha Products Company, Menasha, Wisconsin (a division of Marathon Paper Mills Company), was recently organized, when ninety-five employees with service records of twenty-five years or longer were honored at a company dinner tendered them at the North Shore Country Club.

Several of the employees began their service with the Menasha Printing Company, founded in 1900. Others started with the Menasha Carton Company, established in 1912. The latter company merged with the printing company in 1917 to form the Menasha Printing and Carton Company, which, in turn, became a division of the Marathon Paper Mill Company in 1927.

Principal speaker of the evening was D. Clark Everest, president and general manager of the Marathon company.

◆

SOCIETY TO LAUNCH NATION-WIDE STUDY ON FOREST EDUCATION

A nation-wide study will be undertaken by the Division of Education of the Society of American Foresters to co-ordinate forest education more effectively with the war effort.

This announcement has been made by Dr. Joseph S. Illick, head of the Department of Forest Management, and Acting Assistant Dean of the New York State College of Forestry, Syracuse, New York. Dr. Illick has been elected as chairman of the Division of Education for the biennial period 1944-1945.

◆

BOOKLET DESCRIBES WOOD PULP—A BASIC AMERICAN INDUSTRY

A booklet entitled "Wood Pulp . . . a. Basic American Industry" has just been released by Oliver M. Porter, executive director of the U. S. Pulp Producers Association.

This publication tells the story of wood pulp, what it is, how and where made, and its uses in peace and in war. Its purpose, as described by Mr. Porter, is to indicate the extent to which the products of the U. S. Pulp Industry are meeting the requirements of war and essential civilian needs. The booklet was prepared under the direction of Harry Houghton, chairman, Public Relations Committee, of the U. S. Pulp Producers Association. Copies may be obtained from the Association at 122 E. 42nd Street, New York 17, N. Y.

◆

HAMMERMILL WINS SECOND WHITE STAR FOR "E" PENNANT

For the third time in eighteen months, the Hammermill Paper Company of Erie, Pennsylvania, has won the Army-Navy Production Award for high achievement in the output of war materials.

On September 15, 1942, Hammermill was the first paper mill in the United States to win the Army-Navy Production Award which entitled the mill to fly the "E" pennant on its

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SUCCESSFUL stainless steel welding, as many a shop has found out the hard way, puts a premium not only on knowing what to do, but also what to avoid doing—and why.

That is because the problem, first of all, is a double one as compared to ordinary carbon steel welding, since it calls for maintaining the corrosion resistance of the parent metal across the weld area, as well as its strength. Furthermore, although stainless steel welds easily, the various members of the stainless family differ considerably from carbon steel—and even from each other—in the physical and chemical phenomena they exhibit during the welding process.

Information, clear and complete, is the basic answer. We've supplied it in a new 64-page, full-color booklet, *"Welding Stainless Steels,"* covering all the commonly-used hand or machine methods of welding Allegheny Metal. Employing a new idea in graphic illustration, this book is, we believe, the most complete and understandable coverage of the subject yet published—a welding shop "bible" purposely made so clear and simple that it is also ideal for student training. ● *Write for your copy (see at left).*

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grounds. On April 10, 1943, a second citation was given to the plant.

◆

▶▶▶ A WHITE STAR has been awarded The Fox Paper Company, Lockland, Ohio, to be added to its Army-Navy "E" pennant. The facilities of the company are almost entirely devoted to war work. A star is awarded each six months for continued production excellence.

◆

▶▶▶ AS ITS CONTRIBUTION to the collection of wastepaper, the *Chicago Daily Tribune* conducted an intensive two-day drive which called on 50 department heads and supervisors to scuttle all old paper. This drive resulted in collecting 10 tons of old records, files and printing forms that eventually would have been scrapped.

◆

FINANCIAL

▶▶▶ The generally improved tone of the securities market was reflected in March advances in the current prices for paper mill stocks and bonds.

American Writing Paper Corporation — Net profit for 1943 was $244,966, as compared with $233,936 in 1942.

Bedford Pulp & Paper Company—The company has been sold to the National Container Corporation, which will issue $4,500,000 in fifteen year debentures to cover the purchase and expanded capital for the increased operations.

Bryant Paper Company—Net income for 1943 was $220,552, as compared with $231,740 in 1942.

Certain-teed Products Corporation—Net earnings for 1943 were 750,250 as compared with $1,231,415 in 1942.

Container Corporation—Net profit in 1943 was $2,884,054 as compared with $2,401,748 in 1942.

Crown Zellerbach Corporation — Net profit for the nine months ending with January was $5,656,174, as compared with $5,327,483 for the corresponding period of the previous fiscal year. In January the corporation prepaid $500,000 of its $3,000,000 in long term bank loans, due in 1946 and 1947.

Eastern Corporation—Net earnings in 1943 were $391,698 as against $444,216 in 1942.

Robert Gair Company—Net profit for 1943 was $1,064,486 as compared with $991,905 in 1942.

P. H. Glatfelter Company—Net profit in 1943 was $175,667 as compared with $194,398 in 1942.

Great Northern Paper Company—Net profit in 1943 was $1,237,215 as compared with $1,686,528 in 1942.

Hammermill Paper Company—Net income for 1943 was $585,028 as against $551,388 in 1942.

Hinde & Dauch Paper Company—Net profit for 1943 was $996,530 as against $1,003,036 in 1942.

Hummel-Ross Fibre Corporation—Net profit for 1943 was $394,865 as against $405,696 in the previous year.

Kalamazoo Vegetable Parchment Company—Net income for 1943 was $823,479 as compared with $656,096 in 1942.

Keyes Fibre Company—Net profit in 1943 was $203,466 as compared with $210,944 in 1942.

Kimberly-Clark Corporation — Net profit for 1943 was $2,301,754 as compared with $2,185,443 for the previous year.

Masonite Corporation — Net profit for the quarter ending February 29 was $227,164 as compared with $256,845 for the comparable period in the previous year. Six months earnings ending February 29 were $509,719 as against $603,430 for the comparable period a year ago.

Minnesota and Ontario Paper Company—Net profit for M&O and subsidiary companies, in U. S. and Canada, was $2,814,108 for 1943 as compared with $3,764,016 in 1942.

Nashua Gummed & Coated Paper Company—Net profit for 1943 was $470,363, compared with $429,261 in 1942.

National Container Corporation—Indicated new profit for 1943, after $75,000 reserve for re-negotiation was $816,997, compared with $654,833 the year before.

Oxford Paper Company—Net profit for 1943 was $838,000.

Puget Sound Pulp & Timber Company — Net profit in 1943 was $456,650 as compared with $702,206 in the previous year.

Rayonier, Inc.—Net profit for the nine months ending January 31 was $1,230,614 as compared with $1,537,623 for the comparable period a year ago.

River Raisin Paper Company—Net profit in 1943 was $215,886 as compared with $142,285 in 1942.

St. Regis Paper Company—An extensive re-organization of its capital structure will be submitted to a stockholders meeting under which St. Regis will take over some wholly owned subsidiaries. The plan provides for the creation of a new 5% cumulative prior preferred stock, and the re-classification of outstanding 7% cumulative preferred into shares of a second preferred stock. The new 5% stock will be exchanged for the old preferred on a basis of 3.6 shares for 1 of the old. Employees will be given an opportunity to share in the company's ownership by purchases of 250,000 new shares of common to be issued for this purpose.

Schumacher Wall Board Company—Net profit for nine months to January 31 was $111,539, as against $113,812 for the same period in the preceding fiscal year.

Scott Paper Company—Net profit in 1943 was $1,534,926 as compared with $1,750,793 in 1942.

Union Bag & Paper Corporation—Net profit for 1943 was $1,058,476, as compared with $1,890,401 in the previous year.

United States Envelope Company—Net profit for 1943 was $811,208 as against $583,635 in 1942.

S. D. Warren Company—Net income for 1943 was $509,246 as compared with $342,719 in 1942.

West Virginia Pulp & Paper Company—Net profit for the quarter ending January 31 was $623,832, as compared with $764,718 in the comparable quarter of the preceding year.

New York Stock Exchange—Stocks

	Closing Prices	
	March 25	**Feb. 25**
A. P. W. Paper Co.	3	2⅞
Celotex	12	11¼
Same Preferred	17¼	17½
Certain-teed	5⅜	*5⅜–5¾
Same Preferred	62¾	60
Champion P. & F. Co.	25	26⅞
Same Preferred	109¼	110–111
Container Corp.	23¼	20⅜
Cont. Diamond	12⅜	11⅞
Crown Zellerbach	17	16½
Same Preferred	98½	99¾
Dixie Vortex	16	16⅞
Same "A"	44¼	44⅞
Robert Gair	3½	3⅜
Same Preferred	14⅞	14⅞
Gaylord Container	14½	13⅞
Same Preferred	54	*53–54½
International Paper	15	14½
Same Preferred	74½	69⅞
Kimberly Clark	34	*32–33
McAndrews & Forbes	26½	26¾
Masonite	38½	40½
Mead Corp.	9⅜	8⅞
Same Preferred	*88–90	*86½–88
National Container	14¼	*13–13⅛
Paraffine Cos.	48½	*44½–45½
Same Preferred	105	104¾
Rayonier	15	15⅛
Same Preferred	30	28½
Scott Paper	39½	41¾
Same 4½% Pfd.	*109–110	*109–111½
Same 4% Pfd.	108¾	*107½–108½
Sutherland Paper	31	31¼
Union Bag & Paper	10⅝	9⅝
United Paperboard	5⅛	4½
U. S. Gypsum	71½	71½
Same Preferred	*176–179½	*176

New York Stock Exchange—Bonds

Abitibi 5%	71½	.....
Celotex 3¾%	103⅜	102⅜
Certain-teed 5½%	100½	101
Champion P. & F. Co. 4½%	.....	.....
International Paper	104¼	104½
Same 6%	105¾	108

New York Curb Exchange—Stocks

Am. Boxboard	.....	.....
Great Northern	33	.....
Hummel Ross	5¼	5
St. Regis	4⅜	5⅜
Taggart	5¼	.....
United Wall Paper	2½	2½

*Closing Bid and Asked Prices

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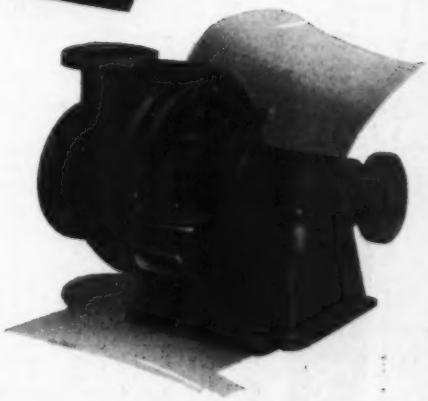
No, we aren't looking for trouble, but if you have a "tough" pump job, we have just the pump required. Our engineers know that pulp and paper mill service requires equipment for 24-hour-a-day service. Therefore, they have provided extra strength in such vital parts as the pump shaft and bearings. These extras are an assurance of dependable service in your plant.

Ask the Ingersoll-Rand representative for details on stock pumps and other pumps for the pulp and paper mill. Ingersoll-Rand Company, 11 Broadway, New York 4, N. Y.



Ingersoll-Rand
CAMERON PUMP DIVISION

10-406

COMPRESSORS • TURBO-BLOWERS • ROCK DRILLS • AIR TOOLS • CENTRIFUGAL PUMPS • CONDENSERS • OIL AND GAS ENGINES

Check List OF MONSANTO PLASTICIZERS

. . . to help you make the most efficient use of available supplies!

With supplies of plasticizers short of wartime needs it is essential that the most efficient possible use be made of every available pound.

That's why it is suggested that you review the Monsanto plasticizers you are now using to make certain they are the best possible materials available for your needs.

A quick glance at this table of the principal Monsanto Plasticizers will give you a preliminary check. A letter will bring you the help of a Monsanto technical service representative in making a final decision. Write: MONSANTO CHEMICAL COMPANY, Organic Chemicals Division, St. Louis, Missouri.

CHARACTERISTICS OF MONSANTO PLASTICIZERS

	Mol. Wt.	Color and Form	Boiling Point	Cryst. or Melt. Point	Sp. G.	Lbs. per Gal.	Refrac. Index	Evap. Rate Gms./sq.cm/hr/ 100°C	Solubility in Water	Retentivity in N/C	Retentivity in Ac/C	Light Fastness in N/C	Light Fastness in Ac/C	USES
Tricresyl Phosphate	368	Colorless liquid	295°C/13 mm	Non-cryst., solid at −35°C	1.165/20°C	9.7	1.556/20°C	0.00000708	Less than 0.002% at 85°C	100 plus	0	Poor	—	Excellent compatibility with most resins and plastics except cellulose acetate; imparts excellent flexibility with a minimum decrease in tensile strength; excellent fire retarding properties.
Triphenyl Phosphate	326	White flakes	245°C/11 mm	48.5°C	1.268/60°C	10.5	———	0.00000028	0.001% at 34°C 0.002% at 34°C	100	80	Poor	Fair	Standard fire retarding plasticizer especially for cellulose acetate; gives clear tough compositions of good flexibility without tackiness.
Santicizer 8	199	Light amber liquid	———	———	1.188/25°C	9.9	———	0.0002659	0.13% at 23°C 0.213% at 48°C	100	90	Poor	Good	Excellent plasticizer for cellulose acetate, giving brilliance and polish; valuable plasticizer for coating designed to withstand petroleum products; increases flexibility of shellac and protein plastics.
Santicizer 9	171	White granules	———	105°C	1.313/25°C	10.9	———	0.000053 at 65°C	1% at 34°C	25–30	25–30	Poor	—	Imparts gloss; gives smooth working and uniform curing of molded phenolic and urea resins; blends readily with most synthetic resins; does not impart softening action of liquid plasticizers.
Santicizer B-16	336	Colorless liquid	219°C/5 mm	Below −35°C	1.097/25°C	9.15	1.490/25°C	0.0000881	0.0012% at 30°C	100	20–30	Excellent	Excellent	With nitrocellulose, gives clear, brilliant films that are flexible, tough, moisture resistant and have good weathering qualities; solvent for and imparts plasticity to most synthetic resins. Non-toxic.
Santicizer E-15	280	Colorless liquid	190°C/5 mm	20°C	1.180/25°C	9.84	1.498/25°C	0.0001106	0.0175% at 30°C	100	100	Excellent	Excellent	With both acetyl and nitrocellulose, it gives clear, tough flexible films that have much increased resistance to moisture penetration. Non-toxic.
Santicizer M-17	266	Colorless liquid	189°C/5 mm	Below −35°C	1.220/25°C	10.2	1.504/25°C	0.000221	0.09% at 30°C	100	100	Excellent	Excellent.	Imparts high degree of permanent plasticity; excellent gasoline resistance. Non-toxic.
Dibutyl Phthalate	278	Colorless liquid	206°C/20 mm	−35°C	1.047/20°C	8.75	1.490/25°C	0.000221	0.001% at 30°C	100	Less than 20	Excellent	—	A standard lacquer plasticizer giving high degree of plasticity; excellent light stability and good weathering qualities.
Diethyl Phthalate	222	Colorless liquid	295°C	−0.3°C	1.123/20°C	9.35	1.503/20°C	0.000617	0.058% at 30°C	100	100	Excellent	Excellent	Generally used in mixture with Dimethyl Phthalate as a plasticizer for cellulose acetate.
Dimethyl Phthalate	194	Colorless liquid	282°C	0°C	1.196/15.6°C	10.0	1.515/20°C	0.001925	0.4% at 32°C 0.6% at 63°C	100	100	Excellent	Excellent	Standard cellulose acetate plasticizer generally used in mixtures with diethyl phthalate or other plasticizers.
Diphenyl Phthalate	318	White powder	———	69°C	1.28/25°C	10.68	1.572/74°C	———	Insol.	65	20	Poor	—	Compatible with nitrocellulose and with the sulfonamide, phenolic, polystyrene and vinyl types of resins; gives increased water resistance to all compositions in which it is used.

Tricresyl Phosphate and Triphenyl Phosphate have excellent Fire Retardation.

MONSANTO CHEMICALS
SERVING INDUSTRY...WHICH SERVES MANKIND

AT TEMPERATURES TO 1100°F.

DM IS THE PR[illegible] BALANCED ALLOY STEEL

IN numerous cases, Timken Seamless Tubes made of DM Steel have been the answer to problems in high pressure piping, cracking still tubes and heat exchanger tubes.

DM is a properly balanced alloy steel for service at elevated temperatures where corrosion is not severe. It contains the right proportions of chromium, molybdenum and silicon for maximum load carrying ability up to 1100°F. Yet these elements have been kept within such limits that excellent weldability has been maintained.

Before you make replacements consider Timken Seamless Tubes of DM Steel. Take advantage of their load carrying ability, resistance to oxidation, corrosion resistance, good weldability, freedom from pronounced air hardening, and moderate cost.

TIMKEN
TRADE-MARK REG. U. S. PAT. OFF.
SEAMLESS STEEL TUBES

Complete data on this and other high temperature steels are available on request. Steel and Tube Division, The Timken Roller Bearing Company, Canton 6, Ohio.

PAPER Put it There!

EVERY FIGHTING PLANE in the sky started on paper. Thousands of pounds of drafting and blue print paper are used in the designing of every model.

Paper goes into the plane itself—into laminated wing flaps, fin tips, seats, steps, panels; for filters in its engines; for charts in its control devices; for practice bombs; for the vital maps that guide it to its target.

Thus the paper industry continues to make an ever increasing contribution to the growth of America's Air Armada.

KENWOOD WOOL PRODUCTS

F. C. HUYCK & SONS

Kenwood Mills

Albany New York

F. C. Huyck & Sons is proud to be serving an industry so essential to the war program. Our skill, our facilities and our 72 years of experience are always available in solving the special felt problems created by urgent wartime paper needs.

Big BOOST TO PRODUCTION

★ The "TRANSPORTER" is ready to operate at the trucker's command—forward or reverse —with complete brake and speed control. Just a movement of the handle, a push of the button—and away it goes at safe walking speed. The "TRANSPORTER" proves its worth over and over to increase efficiency and safety of handling operations and to keep products flowing in all departments on those short hauls from one process to another.

Such positive and continuous help in maintaining a systematic materials handling system gives a big boost to production all along the line. Bigger loads move faster and with the greatest of ease on this battery powered equipment—INEXPERIENCED HELP—men or women, move thousands of pounds of material in minimum time — and it doesn't require muscle—there's no fatigue. Write for details.

- Positive Mechanical Brake
- Controls in Steering Handle
- Forward and Reverse Speeds
- Front Wheel Power Drive
- Shockless Hydraulic Lift with Easy Foot Control

MANUFACTURERS FOR OVER THIRTY FIVE YEARS *Electric Propelled* INDUSTRIAL TRUCKS

AUTOMATIC TRANSPORTATION CO.

113 WEST 87th STREET — DIV. OF THE YALE & TOWNE MFG. CO. — CHICAGO 20, ILLINOIS

SHOOTIN' CORDWOOD

ALTHOUGH having the appearance of stacked pulpwood, ready for paper making, they are actually empty shell cases. The smokeless powder which filled these shell cases may have been made from wood pulp.

Whether making smokeless powder or paper from wood pulp, mill operators everywhere are securing greater efficiency and economy through the use of Texaco.

Texaco steam cylinder oils, for example, assure less oil consumption and quiet engine operation. They atomize completely, adhere to cylinder walls and separate rapidly from the exhaust.

So effective have Texaco lubricants proved that they are definitely preferred in many fields, a few of which are listed at the right.

Texaco Lubrication Engineering Service is available to you through more than 2300 Texaco distributing points in the 48 States. The Texas Company, 135 East 42nd Street, New York 17, N. Y.

THEY PREFER TEXACO

★ More stationary Diesel horsepower in the U. S. is lubricated with Texaco than with any other brand.

★ More Diesel horsepower on streamlined trains in the U. S. is lubricated with Texaco than with all other brands combined.

★ More locomotives and railroad cars in the U. S. are lubricated with Texaco than with any other brand.

★ More revenue airline miles in the U. S. are flown with Texaco than with any other brand.

★ More buses, more bus lines and more bus-miles are lubricated with Texaco than with any other brand.

TEXACO

TEXACO Lubricants

FOR THE PAPER INDUSTRY

TUNE IN FRED ALLEN EVERY SUNDAY NIGHT – CBS ★ HELP WIN THE WAR BY RETURNING EMPTY DRUMS PROMPTLY

Editorial

Pulp and Paper Shortage Increasingly Acute

▶▶▶ THE SHORTAGE OF PAPER only recently recognized by the War Production Board as an essential commodity for both war and essential industry economies continues to grow increasingly acute.

One of the outstanding officials of the WPB stated at the February convention in New York: "Paper and paper products are the outstanding headache confronting us." The paper industry began this year with a shortage of between two and one-half million and three million cords of pulpwood. Last year, the reserves of pulpwood in mill inventories was reduced by 700,000 cords.

General Ayres, of the Cleveland Trust Company, stated in his forecast for 1944 that the outstanding problem confronting the United States is the procurement of three million men for the Armed Forces and three million men for essential industries.

The drive for the procurement of manpower has been speeded up and thus adds to the problem of obtaining men for work in the forests. In fact, qualified woodsmen who should remain in the forests and were deferred are now being taken in the draft for additional needed manpower. Not only is there a shortage of men for cutting pulpwood, which is the basic raw material of the paper industry, but a shortage of men for the collection of old papers is now becoming acutely apparent.

The junk men, pushcart operators and collectors of wastepaper under the old system have forsaken that business and its meager compensation for better paid jobs. So, this very material source of secondary pulp is depending entirely upon widespread advertising and publicity to arouse patriotic citizens to come to the aid of their country.

It is hard to believe that we can collect eight million tons of wastepaper, which WPB says is necessary this year for the maintenance of essential paper production, when never before have more than about six million tons been collected.

Looking at the present supply situation and comparing it with that of two years ago, we are facing a shortage of several million tons this year of essential raw materials for papermaking. In addition, the Government through its executive officers of the OPA has refused to put behind the effort to produce more paper its most powerful stimulant, a justified raise in prices for the products of the industry.

The aggregate annual tonnage of the paper industry is over twenty million tons. To keep the mills running to capacity, a continuous uninterrupted flow of raw materials must be provided. The paper industry cannot function with its raw material supply system in such a crippled condition as exists today. Unless a more adequate system is organized without delay, an economic catastrophe may occur in both war and essential industry economies.

"Muffing It"

▶▶▶ IT IS RECORDED that newspapers devoted great space to reporting the address of the orator who was on the program with Abraham Lincoln at the dedication of the battlefield at Gettysburg. Lincoln, on the other hand, received some such mention as "President Lincoln also spoke." Since that time, Lincoln's Gettysburg address has become immortal; but how many persons, even fairly well versed students of American history, can recall the name of Lincoln's companion speaker on that eventful day in November of 1863. Failure of the press to recognize the full importance of Lincoln's brief address constituted a "muff" on its part.

Similarly, it is told that the *Baltimore Sun* published the story of Samuel Morse's successful public demonstration of the telegraph on an inside page of its newspaper under a column headed "Local Matters." You will recall that Morse was in Washington, in the Supreme Court Room, and the message "What hath God wrought?" was sent by him over the wires to an operator located in the Baltimore & Ohio railroad station in Baltimore. The Baltimore newspaper had the opportunity of doing a real job in reporting this scientific accomplishment but it failed to do so.

Of course, there is the adage that hindsight is better than foresight; but then, too, the Bible records, "Where there is no vision, the people perish." (Prov. 29, 18).

The pulp and paper industry, because of its importance to the war effort and because of some of the problems developed as a result of its participation in this effort, is more in the public consciousness today than probably at any time since the modern industry developed. A public relations job has been done to bring about this situation. This job has been and is being done purely as an emergency measure. What will be done by the industry after the War to hold what has been gained by this effort and to extend the public relations program much further? It is realized that some effort has been made to plan for such a program, but to be successful, the effort will have to be far reaching and comprehensive. There must be no muffing of the opportunity, if the industry is to meet the competition of other industries that is bound to come after the War.

Current Thought . . . . WILLIAM SIBLEY

Plenty of Fringe on the Top of Living Conditions—A. T. (After Tojo)

▶▶▶ THE SET OF DISHES you buy after the war may be made of glassware or look exactly like china. But they won't break. The careless child or the clumsy husband may drop the cup and saucer to the floor, but the dishes will merely bounce and come to rest without a chip or a fracture. Such dishes are not a dream. They are a reality, and the Army and Navy are using them now!

The world to come is being shaped today in the laboratories of America. An almost endless number of new materials and new processes for the rebuilding of our postwar world are now in the hands of research chemists. Familiarity with these materials and methods will enable us to plot many of the applications that lie in the future. War is a vicious cauldron, but from every such cauldron have come many developments and improvements which otherwise would have been slow in crystallizing or would not have come at all. The Civil War brought into the open the realization of the need for improved transcontinental transportation. Better railroads and highways resulted; a whole empire opened for colonization. World War I taught us much about commercial aviation. Out of this War, frightful as it is, has already come knowledge of new drugs and strange curative measures. The new and wicked mechanical means for destruction which have been developed will one day be put to constructive tasks.

Years ago, when rayon first began to replace silk, your correspondent said, in effect: "the advent of rayon, which replaces the use of Japanese silk and thereby ruins that country's chief industry, may be argued in the chancellories of the world." Well—here we are—arguing the matter of rayon in New Guinea, Rabaul, Wake, Burma, and the Aleutians. When we lost Burma to the Japanese we lost 97 per cent of our raw rubber supply. Without rubber we would be economically paralyzed in peacetime and helplessly crippled in wartime. Something had to replace it, not only for the successful prosecution of this War, but for our economic progress after the War, since the British and the Dutch cut down the majority of the rubber plantations before the Japs could take possession. And it will be at least five years before those rubber trees can be grown again.

Fortunately, we have a great abundance of the materials right here in the United States to manufacture synthetic rubber—petroleum, natural gas, and agricultural products. Also fortunately, due to the foresightedness of our great rubber companies, these synthetic rubbers already have been made successfully. Synthetic rubber tires have been produced and experiments have shown that they give service comparable to the best natural rubber ever imported. In co-operation with the Government, these companies are now rushing to completion plants for the production of at least 800,000 tons per year of synthetic rubber, but to get the necessary synthetic capacity and the large-scale manufacturing experience will all take time. Our limited crude rubber supplies and our very considerable back log of reclaimed rubber gives us a chance to bridge the gap, along with the available synthetic rubber and rubber substitutes.

Probably the most interesting of all the rubber substitutes is Thiokol. Some years ago Dr. Patrick, of Kansas City, was working on the idea of producing a new type of antifreeze for automobile radiators. He first heated a caustic soda solution and dissolved in it all the sulphur it would take. One day when he was making this, he accidentally spilled some ethylene dichloride into it. Instead of throwing it away, he simply set it aside, and when he looked at it the next morning, he found a gummy residue in the beaker. This is crude Thiokol. This is the basic material from which all the thiokols are made. It is not rubber in any sense—it does not have the elasticity of rubber, but it looks very much like rubber, and all it takes to make it is sulphur, salt, and still-head gases from petroleum distillation. It can be made in enormous quantities cheaply, and a tire recapped with it will give about 5,000 miles of wear under normal conditions. Of course, it can be milled in with all the synthetic rubbers and can be used as an extender in this way. For many purposes it is actually better than any natural or synthetic rubber. It is especially good for making gaskets and is indispensable for the now famous "Mareng Cells" which are simply huge sacks made of Thiokol with which they fill box cars and then can ship gasoline in these Thiokol bags and convert any box car, truck, or other conveyance into a tank car. For hose to be used in the delivery of gasoline, oils, and other organic solvents, Thiokol is very definitely better than any rubber in the world, and it will find wide use for household articles, such as bathmats, hot water bottles, and numerous other articles of this type. Thus the accident of Dr. Patrick turns out to be a great lifesaver in this time of rubber shortage.

Interesting Miscellany

There promises to be considerable shift in postwar manufacturing activity. Not only will some airplane manufacturers go into the manufacture of automobiles — and vice versa — but many of the now existing war plants will be converted to the manufacture of peacetime products and thereby effect a permanent change in population shift. The Aviation Corporation, of New York City, for instance, is planning to enter the electrical appliance field, chiefly in the major units such as washing machines, refrigerators, ranges, etc. General Mills, the Minneapolis cereal people, have used small electrical appliances as premiums for many years. Now, it is rumored, this company will make its own toasters and other appliances after the War.

Our radios presently will be equipped with facsimile attachments which will automatically record recipes as they are spoken, news-casts which are delivered by foreign stations at hours inconvenient to our listening, news photos and maps which will clearly illustrate commentator's remarks. We will have matches which will ignite even after having been soaked in water; eggs packaged in links like sausages; phonograph records sold on a monthly or yearly subscription basis like the "Book-of-the-Month" clubs; every type of education broadcast by radio and television; paper containers more largely replacing tin cans and glass jars.

SEVEN-LEAGUE BOOTS

SEVEN-LEAGUE BOOTS have been donned by this nation's dyers and dyestuffs makers since we entered the war. Speed and production are the order of the day.

During this period it should be mutually helpful for us to work together. Our laboratories can help you solve your wartime technical problems. And we may, in addition, gain the experience and knowledge which will guide us in advance to profitable solutions of tomorrow's problems. E. I. du Pont de Nemours & Co. (Inc.), Organic Chemicals Department, Dyestuffs Division, Wilmington, Del.

Du Pont Dyestuffs

DU PONT DYESTUFFS

BETTER THINGS FOR BETTER LIVING . . . THROUGH CHEMISTRY

Are you properly emphasizing the SAVINGS FEATURE OF YOUR PLANT'S PAYROLL SAVINGS PLAN?

WITH the war swinging into its tensest phase, now's the time to emphasize over and over again the *savings* feature of your Payroll Savings Plan. To press home to all your people the need of building up their savings—the need of building up their savings not only in wartime but also in the years directly after the war. To point out that a bond cashed before its full maturity is a bond killed before it has given its fullest service to its owner—*or to his country!*

Buying War Bonds, holding War Bonds, and keeping wartime savings mounting—all are absolutely vital. But no one of these is enough by itself. The *savings habit* must be carried over into the years of reconstruction which will follow the war. For if, at war's end, we have 'flash-in-the-pan' spending, *everybody loses.* The spender loses, you lose, and the country loses! While a working public, convinced of the value of continued, planned saving, is the soundest possible foundation for private enterprise of every sort.

We call these bonds War Bonds—and with their aid we will win this war at the earliest possible moment! But they're Peace Bonds, too—and, rightly used, they will win for their holders, *and for all of us,* a happy and prosperous place in the years of peace to come.

WAR BONDS to Have and to Hold.

The Treasury Department acknowledges with appreciation the publication of this message by

THE PAPER INDUSTRY and PAPER WORLD

★ Let's All Back ★ the Attack... ★ with War Bonds!

This is an official U. S. Treasury advertisement—prepared under auspices of Treasury Department and War Advertising Council

HOW LONG Should a Dryer Felt Last?

Because a Dryer Felt's cost is only a small fraction of the total cost of drying paper—many progressive mills today are saving money, not by "stretching the life" of old felts, but by replacing them as soon as their drying efficiency begins to fall off. One plant reports a material saving in steam cost alone, when they removed an old felt with glazed-over and clogged weave preventing free elimination of moisture.

The new Felt used was the HOOPERWOOD Style 218—an extra-porous, light-weight Cotton Felt with smooth surface for fine finish and with the same working strength as heavy felts.

The lower first cost of this felt means they don't have to stretch its life beyond its efficient usefulness to get their money back, while its better moisture elimination pays them dividends in steam economy every day it runs.

If your present dryer felts are costing too much per ton of production, we will be glad to discuss the problem with you and help you choose the particular HOOPERWOOD Felt to best meet your operating conditions.

WM. E. HOOPER & SONS COMPANY

PHILADELPHIA, PENNSYLVANIA

Since 1800

HOOPERWOOD DRYER FELTS

What good is a $10.00 raise ...if it then costs you $12.00 more to live?

SURE WE ALL want a raise . . . but raises today are bad medicine. Bad medicine for you. Bad medicine for everybody else. And here's why . . .

Suppose you do get a raise . . . and a lot of others get one, too. What happens? The cost of manufacturing goes up. Naturally your boss has to add this increase in cost to the price he asks the retailer. And the retailer, in turn, raises his price to the consumer . . . that's YOU.

Multiply these hundreds of items that everybody has to *pay more for* by the thousands of other workers who want raises . . . and by the thousands of business men and farmers who want more money for their products . . . result . . . you and all the others need another raise to make ends meet.

And so it goes . . . wages and prices chase each other up and up . . . until prices get so high that your dollar isn't worth a dollar any more.

So what good is a raise if your living costs go up even faster? And there's so little you can buy today anyway . . . with most factories in war production.

Of course it's hard to give up the luxuries of life . . . and even harder to give up some of the necessities. But this is War! And when you think of the sacrifices our fighting men are making . . . many of them giving up their lives for us . . . no sacrifice we can make should be too great.

So if you want to be able to enjoy the good things of life in the peaceful days to come . . . if you want to speed victory and thus save the lives of thousands of fighting men . . . start doing these seven things now . . .

1. Buy only what you *need*. Take care of what you have. Avoid waste.

2. Don't try to profit from the war. Don't ask more than you absolutely *must* for what you have to sell . . . whether it's *goods* or your own *labor* you're selling.

3. Pay no more than ceiling prices. Buy rationed goods only by exchanging stamps. Otherwise, you're helping the black-market criminals, hurting yourself and all other good Americans.

4. Pay taxes willingly. They're the cheapest way of paying for the war.

5. Pay off your old debts—all of them. Don't make new ones.

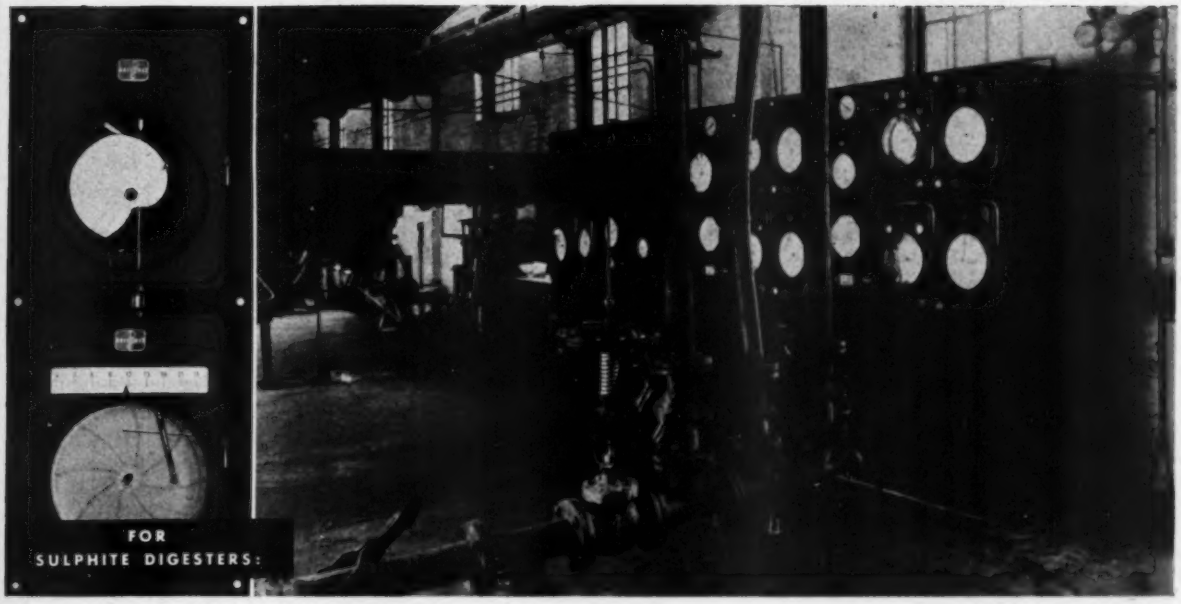
6. If you haven't a savings account, start one. If you have an account, put money in it—regularly. Put money in life insurance, too.

7. Buy and hold War Bonds. Don't stop at 10%. Remember—Hitler stops at nothing!

Use it up . . . Wear it out. Make it do...Or do without.

HELP US KEEP PRICES DOWN

A United States War message prepared by the War Advertising Council; approved by the Office of War Information; and contributed by the Magazine Publishers of America



A Potentiometer-Type Time-Temperature Controller

that is both *Sensitive* and *Rugged*

Since chips are cooked to time pressure and temperature alone, it is vital to have continuous and accurate recordings and control.

Bristol's Pyromaster Time-Temperature Recorders and Controllers provide the sturdiness which earlier potentiometer-type instruments lacked for this service. Construction is greatly simplified . . . all parts are accessible even when in operation . . . there are no continuously-moving parts to require frequent lubrication . . . accuracy is not affected by plant vibrations . . . and a high-torque motor is utilized for ruggedness.

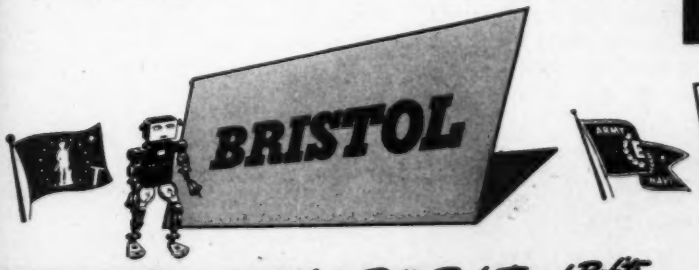
In the Pyromaster Controller used with circulating systems, a metal disk, shaped to the desired control curve, is mounted on the shaft of a synchronous motor. A cam follower continuously resets the control point of the controller to agree with the control curve, thus assuring liquor temperatures exactly as specified.

Write for more information on Bristol instruments for sulphite digesters.

THE BRISTOL COMPANY, 149 Bristol Road
WATERBURY 91, CONN.

The Bristol Co. of Canada, Ltd.
Toronto, Ontario

Bristol's Instrument Co., Ltd.
London N. W. 10, England



Engineered Process Control for Better Products and Profits

Complete direct-heated circulating system for sulphite digesters, equipped with Bristol Instruments.

AUTOMATIC CONTROLLING AND RECORDING INSTRUMENTS

New, more efficient equipment for washing pulp

The Swenson-Nyman Pulp Washer

does the work of two ordinary drums

Two-stage washing on a single drum . . . washing area twice as large as the sheet-forming area . . . independently controlled vacuum on each stage . . . strong and weak liquors handled separately.

These are some of the features of the new Swenson-Nyman Pulp Washer which is replacing two (and sometimes three) ordinary drums in kraft and soda pulp mills. Users report that pick-up and sheet formation are uniform, even with very hard and free pulps. Backwashing is entirely eliminated.

Swenson engineers have not been unmindful of the needs of the pulp and paper industry, despite the preoccupation of production facilities with important war orders. The Swenson-Nyman Pulp Washer is the result of development that has been carried on continuously to help increase pulp mill efficiency. Write for detailed information about this startling new equipment.

One of several Swenson-Nyman pulp washer installations—now in operation.

SWENSON

SWENSON EVAPORATOR COMPANY

Division of Whiting Corporation

15653 Lathrop Avenue, Harvey, Ill.

Some Observations on

WET STRENGTH PAPER

K. W. BRITT, Research Chemist
Scott Paper Company

▸▸▸ PAPERMAKING IS ESSENTIALLY a reversible process. When dipped in water, a sheet of absorbent paper undergoes an instantaneous loss in strength. A little mechanical action quickly reduces the wet paper to a pulp, which, diluted with water, is similar to the stock from which the paper was originally made. If the sheet is allowed to dry without being disintegrated, it recovers practically all of its original strength. Of all the properties of ordinary paper there is none more characteristic than the loss and gain in strength in passing back and forth between the wet state and the dry state. Papers containing materials which make them water repellent or difficult to wet do not lose their strength as quickly when exposed to water, but once thoroughly saturated they are no stronger than corresponding absorbent papers.

Wet Strength of Untreated Paper

Careful tests show that a sheet of paper *does* retain a small proportion of its strength even when thoroughly wet. Also, different papers show different degrees of wet strength even though no specific wet strength treatment is applied. Table I gives the wet and dry strengths of various papers, none of which has been specifically treated for wet strength. In spite of the difference existing among these papers the most noteworthy fact is that none retains more than a very small proportion of its dry strength. In performing the tests, the TAPPI standard method for wet tensile was used, with the exception that care was taken to make sure that the papers were thoroughly saturated before testing.

In the examination of wet strength data, it has become the author's custom to give more regard to the percentage retention of strength when wet than to the absolute value of wet strength. This comes about from the wide diversity of weights, character of fiber, degree of hydration, etc., found in the various grades of paper. If the weight or degree of beating of a given paper is increased, the strength of the sheet, both wet and dry, also will increase. However, it is illogical to consider increasing the weight, for example, to be a wet strength process. Accordingly, in the following discussion, the ratio between wet and dry strength is considered the real criterion of the wet strength property. This is by no means to deny the importance of the absolute value of wet strength as a test of the use performance of a paper.

From the data in Table I, certain conclusions of interest may be drawn. Papers containing groundwood tend to have greater wet strength than papers free of groundwood. Furthermore, these papers tend to increase in wet strength upon aging, sometimes to a marked degree. It seems fair to say that papers made from the more highly purified fibers are characterized by low wet strength, while papers containing more encrusting materials are somewhat higher in wet strength. Alkaline cooked pulps produce papers of lower wet strength than do acid-cooked pulps. Rosin sizing and even waxing have no appreciable effect upon wet strength provided the paper is thoroughly wetted before testing. Tub sizing and coating seem to increase the wet strength slightly. Manila and rag fibers have no advantage over wood pulp. In all cases we find that papers which have not been specifically treated for wet strength do not vary appreciably in their ratio of wet to dry strength. The choice of certain fibers or papermaking techniques to produce "wet strength" is largely a matter of producing simply a stronger sheet. This is a perfectly legitimate means of increasing the absolute value of wet strength and will happen with any paper. However, the amount of additional wet strength that may be obtained in this way obviously is quite small.

In some respects it is a break for the papermaker that ordinary paper *does* lose most of its strength when wet. Thus he is able to re-use broke and wastepaper with a minimum of trouble. However, for some uses of paper a certain amount of strength or resistance to disintegration when wet is a desirable or necessary feature. With the constantly greater diversification in the uses to which paper is put, and with the constant search for greater utility in the older types of paper, there has been a growing interest in such special paper properties as wet strength.

Definition of Wet Strength Paper

In view of the above considerations and of the data in Table I, a wet strength paper may be defined as being a paper in which the wet tensile strength is at least 15 per cent of the dry tensile strength. In other words, any paper, the wet tensile strength of which is 15 per cent or more of the dry tensile strength, has been given some sort of wet strength treatment. It is admitted that this definition is open to some objection. Referring again to Table I, it is necessary to do more than double the wet strength of some papers in order to reach 15 per cent, while with others the increase needs to be only one-third. Thus one might argue that it would be possible to have a paper treated for wet strength which still might not equal the 15 per

TABLE I

Kind of Paper	Dry Tensile lb./15 mm.	Wet Tensile lb./15 mm.	Per cent retention of tensile when wet
Towel, 35% groundwood			
New paper	2.42	0.25	10.3
Aged	2.60	0.31	11.9
Towel, all chem. pulp	2.00	0.12	6.0
Kraft wrapping	14.5	0.93	6.4
White paraffined tissue	4.8	0.37	7.7
High alpha waterleaf	5.05	0.21	4.15
Mg, unsized	2.03	0.18	8.9
U. S. Postal Card Bristol	17.9	1.75	9.8
Blotting	9.45	1.01	10.7
Double coated book	7.07	0.84	11.8
MF sulphite book	6.6	0.52	7.9
MF book, 100% rag	18.0	1.64	9.1
Bond, 100% rag, tub sized	13.7	1.61	11.7
Manila lens paper	4.2	0.15	3.6

cent limit. To satisfy such an argument it would be necessary to know what the wet tensile would be with any given sample were it not treated. Such an involved definition could lead only to confusion.

Any attempt to define wet strength paper broadly on the basis of an absolute value of wet tensile obviously is impossible. The wet tensile of a strong, heavy, untreated kraft may exceed the *dry tensile* of a light, soft tissue. A definition based on absolute value, which would cover kraft, would make a wet strength tissue an impossibility. Both may be defined readily in terms of percentage of dry tensile.

Another very important point in the definition of wet strength paper is the condition of performing the wet tensile test, specifically the degree of saturation of the paper existing at the time of performing the test. All data presented herein and all thinking predicated on that data are based on complete saturation of the sample regardless of the length of exposure time necessary to attain that saturation. A fictitious wet strength which is obtained by virtue of a hard-to-wet sample remaining partially dry after a limited exposure time is specifically ruled out. This by no means denies the usefulness of such products, but any fundamental study of the wet strength property is possible only on the basis of complete saturation of the sample.

Complete saturation of a specimen for wet tensile testing is defined as being that degree of wetness at which no dry areas are apparent and at which no appreciable loss in wet tensile occurs upon further soaking. The use of wetting out agents for accelerating the wetting of difficult-to-wet papers is advantageous.

As to the paper products in which the property of wet strength is of importance, it is fair to say that any paper which comes in contact with water or with wet materials in its normal use, or any paper product which may be exposed to the weather is a potential user of wet strength. There are certain products, paper towels for example, in which the property of wet strength is a "natural." There are many others where the need for wet strength is an open question. It seems likely that we shall see a good deal of evolution in the use of wet strength as time goes on. In many products it may be tried and discarded either because the property is not sufficiently important in the use of the product or because the trouble and expense of the process outweighs the advantages. Here and there along the way, products will be found in which the property of wet strength is vital. It will require time and diligence to seek out these really important uses. It is in finding these particular spots where wet strength pays real dividends that the paper manufacturer has an opportunity to use enterprise and imagination. The new elements in the present situation are the technical advances in recent years which provide the means for producing papers of high wet strength on a mass production basis at low cost.

Older Wet Strength Processes

Vegetable parchment was the first paper product possessing a high degree of wet strength to come into general use. In the parchmentizing process a sheet of paper is exposed to the action of strong sulphuric acid for a short period of time after which the acid is washed out and the sheet neutralized. The fibers of the paper are fused together by the action of the acid and the character of the sheet is markedly altered from the original. Parchment is characterized by extreme resistance to all disintegrating influences, being unaffected by boiling water, hot acid solutions and hot alkaline solutions.

Another wet strengthening process which has been used for many years comprises the tub-sizing of paper with glue or gelatin and exposing the glue to the action of some hardening agent such as alum or formaldehyde. This process has been applied to papers where the other qualities conferred by surface sizing are of importance, and the wet strength is usually evaluated in terms of wet rubbing resistance.

A third wet strength process which has attracted attention for some time is the incorporation in the paper of cellulose regenerated from viscose. This process was mentioned by Cross and Bevan in 1918 and, in the following fifteen years, was the subject of numerous patents and considerable commercial development.

Growth of Interest in Wet Strength

The greatest interest and development in wet strength papers, however, has occurred during the past ten years. During this period several new processes have come into a considerable degree of commercial use. These new processes to some extent have replaced the older methods enumerated above, but, more important, they have extended the use of wet strength into new fields. In some instances, the application of these new processes has resulted in the extension of the use of paper itself into new products.

As recently as 1935, references to wet strength paper in the literature were quite rare. Such references have become so common that a recent survey (1943) turned up approximately seventy. It may be of interest to classify these references by methods mentioned and this is given in Table II.

Research along this line is proceeding apace in a number of laboratories, and it is to be expected that new and important discoveries are being made. Another list a few years hence will no doubt look quite different.

One of the interesting points regarding this varied list of wet strengthening agents is the variety of wet strength qualities which it represents. In this respect the wet strength paper situation is analogous to the situation that prevails in the field of synthetic rubber or elastomers. As rubber chemists have been careful to point out to us, "rubber" isn't just rubber —there are many types of rubber, each with its particular properties, its

particular defects, its particular advantages. Also, an advantage for one use may be a defect for another. So it is with wet strength paper, and it is very unlikely that any one process will come to dominate the field.

Synthetic Resins

The synthetic resins deserve first place in any discussion of the present wet strength picture. The discovery and development of the function of the synthetic resins in wet strength has worked a sort of minor revolution and has made wet strength known and talked about in every paper mill in the country.

(1) Urea-Formaldehyde

Apparently the first publication to describe the property of wet strength specifically as being conferred upon paper by incorporation of urea-formaldehyde resin, was a British patent issued in March, 1939 *(1)*. The process described in that patent involved the impregnation of the paper with a water solution of the resin, preferably in the form of dimethylolurea, together with a catalyst, and polymerizing the resin *in situ*. Since that time, several other patents and a number of technical articles have appeared *(2, 3, 4, 5, 6)*. It has also been discovered that certain forms of the resin may be added to the papermaking stock and precipitated on the fibers with alum much as rosin size is precipitated on the fibers *(7)*.

One of the interesting features of the urea-formaldehyde process when the resin is applied in the form of dimethylolurea and in strictly limited amounts, is its ability to confer relatively high degrees of wet strength with no apparent change in the other properties of the paper. It is possible to prepare papers which are quite indistinguishable by any physical test other than wet strength from the untreated. This is rather surprising in view of the hard brittle character and water resistance of the resin itself. In spite of this, however, these papers are unchanged in flexibility and water absorbency. If larger amounts of resin are used, the paper becomes hard and brittle and a pronounced loss in tearing strength occurs. It is this fact that probably accounts for the reputation of urea-formaldehyde in some quarters as having a hardening effect on paper. The fact that small amounts of resin, say less than 5 per cent, have very little effect on flexibility, has been explained on the basis that the smaller amounts are contained largely within the fibers of the sheet and thus do not bring about an increased amount of the inter-fiber bonding.

A discussion of the mechanism of producing the wet strength property by means of synthetic resins is found in U. S. Patent 2,325,302 as follows: ". . . there are introduced into the cellulose structure resin-forming ingredients either in the unreacted, the unpolymerized, or the partially reacted state, and thereafter the reaction or a completion of the reaction between these ingredients is effected to produce the desired result. The materials from which the final resin is formed should enter the cellulose structure in the form of a water solution, and for this condition to be fulfilled, the materials should be in the form of compounds of relatively low molecular weight . . . These materials having penetrated the cellulose structure are caused to undergo a condensation or polymerization . . . as a result of the application of heat in the presence of a catalyst, and this reaction results in the formation within the cellulose structure of a water insoluble resin, the presence of which, particularly in that part of the cellulose structure where two fibers have been dried in contact with each other, has the result of rendering the cellulose bond substantially unaffected by water."

The author has found the above viewpoint to be a useful tool in explaining phenomena encountered in the study of wet strength. Further evidence in support of the viewpoint that the resin actually penetrates the fiber and effects changes therein is found in the staining behavior of urea-formaldehyde treated fibers. For example, with an all chemical wood pulp furnish stained with the Herzberg stain, there is a marked decrease in the intensity of the staining when the paper has been treated with urea-formaldehyde for wet strength. There is also a shift in color away from the blue of unbleached fibers in the direction of gray or lavender. The staining of resin-treated fibers represents an interesting field of study which, as yet, has not been explored.

(2) Melamine-Formaldehyde

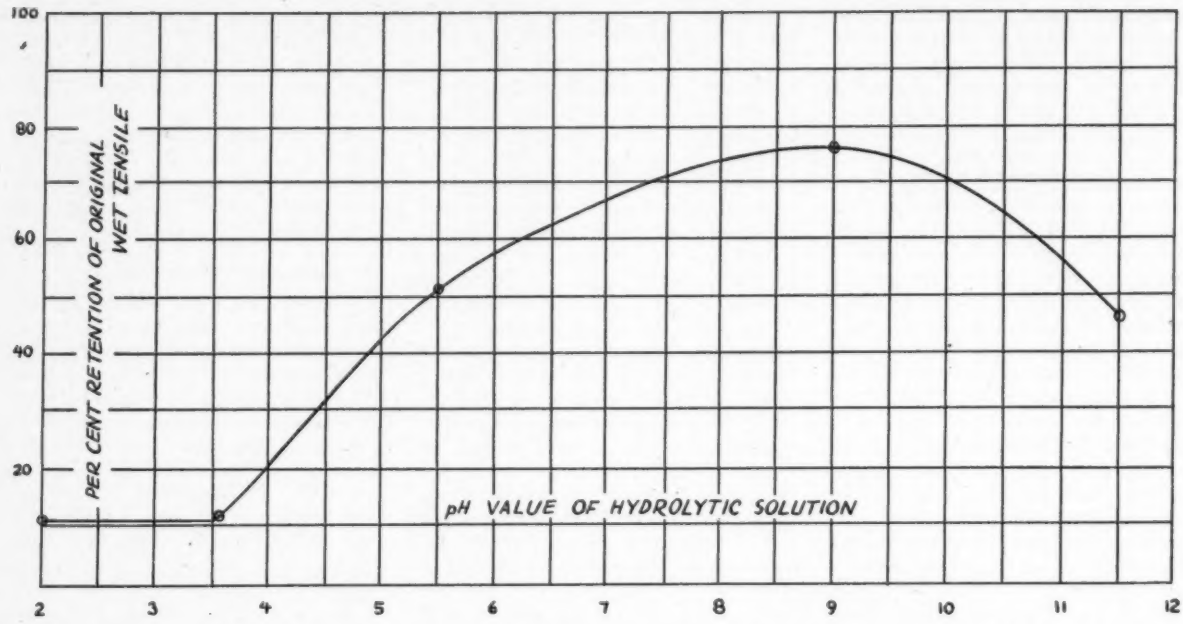
The synthetic resin formed by the reaction between formaldehyde and melamine also has the property of increasing the wet strength of paper. As with urea resin, it is necessary to incorporate the melamine resin with the fiber in the form of an intermediate reaction product and then to complete the polymerization or cure *in situ*. The rate of cure of both urea and melamine is increased by mildly acidic conditions. It is rather interesting that a given amount of either resin will confer about the same amount of wet strength, and that amounts of either resin in excess of about 5 per cent of the fiber do not cause further increase in wet strength. Descriptions of the melamine-formaldehyde process are found in the technical literature within the past two years *(8, 9, 10)*.

Melamine - formaldehyde, however, does differ from urea-formaldehyde in several respects. First, a melamine-formaldehyde solution may be prepared in which the resin is substantive to papermaking stock without the aid of alum or other "mordant." This is of interest to the papermaker who is not equipped to impregnate the sheet during its passage through the paper machine, or who wishes to avoid that very difficult development problem. The second difference between urea and melamine wet strength, is the fact that the melamine resin is more resistant to hydrolysis than the urea resin. This point gives the papermaker two things to ponder over. The melamine resin produces a paper more retentive of its wet strength on long exposure to moisture and other adverse conditions either in storage or in use, while on the other hand such paper is also more difficult to defiber in the form of broke or waste. Such questions make wet strength anything but the simple thing it may seem on the surface.

Because of the prominence which urea-formaldehyde and melamine-formaldehyde have come to occupy in the wet strength picture, it is inevitable that comparison between these two should be a subject of considerable interest. An exhaustive comparison between these two processes is beyond

TABLE II

Wet Strength Method	Number of References	Wet Strength Method	Number of References
Urea-formaldehyde	18	Cellulose esters	3
Viscose	11	Protein cured by heat	2
Cellulose ethers	7	Caustic soda	2
Melamine-formaldehyde	5	Rubber latex	2
Glue-formaldehyde	5	Locust bean gum	2
Sulphuric acid or zinc chloride	3	Polyvinyl resin	1
Drying oil	3	Phenol-formaldehyde	1
Acidified formaldehyde	3	Long fibered stock	1



Hydrolysis curve urea-formaldehyde wet strength paper. Per cent retention of original wet tensile versus pH of hydrolytic solution. Exposure time, 30 minutes. Temperature, 200 Fahr.

the scope of this paper and complete data are not available at the present time. Maxwell *(10)* has pointed out the superiority of melamine papers in tearing strength and folding endurance when the melamine resin is applied in the beater and the urea resin is applied in the tub. Apparently this difference is due primarily to the method of application rather than to the inherent properties of the resin since he shows that melamine resin applied by tub gives results similar to those with the urea resin. Maxwell also points out a much more severe loss of wet strength with age in the case of urea than with melamine. This is undoubtedly an inherent property of the resin, and is a highly important difference. The retention of wet strength with age is related to the hydrolytic resistance of the resin itself as well as being dependent on the conditions prevailing during the aging period. There is also some evidence that the kind of paper influences the loss of wet strength with age. The author has examined some samples of urea-formaldehyde wet strength paper which were several years old and were only slightly changed in wet strength from the original value.

In discussing wet strength, we are led sooner or later to the question of identification of the various types of wet strength. This is too broad a question to be treated fully in this article, and, further, complete data are not available at the present time. Chemical analysis does not appear to be very satisfactory, and, in any case, is cumbersome and involved. It has been found, however, that a study of the hydrolysis of the wet strengthening agent affords a very simple qualitative method that may serve to identify the type of wet strength in many cases. This consists in exposing samples of paper to hot buffer solutions of various *p*H values for fixed periods of time and observing the loss in wet strength. Convenient *p*H values for the buffer solutions are 2.0, 3.2, 5.5, 7.0, 9.0, and 11.0. A convenient temperature is 200 Fahr. and a convenient time is 30 minutes. The loss in wet strength as compared with the original is plotted on graph paper for the various *p*H values. These curves for urea and melamine papers show a certain similarity but are sufficiently different to permit ready identification. Both curves show a decided drop on the acid side and a less pronounced dip at the alkaline end. The greater resistance of melamine to hydrolysis, mentioned above, is evident on the curve. The flat part of the curve or region of maximum stability extends over a greater range in the case of melamine while the acid and alkaline dips are less pronounced than with urea.

The hydrolysis curves for urea-formaldehyde papers prepared by the beater method and by the impregnation method have been compared. These curves are sufficiently similar so that urea-formaldehyde paper may be readily distinguished from other types of wet strength regardless of method of application. There is one difference which is discernible; namely, the hydrolysis in the vicinity of *p*H 5.5 is more severe in the case of the beater-treated paper and this may serve to identify the method of application.

The accompanying graph shows a typical hydrolysis curve and happens to be for urea-formaldehyde paper made by the impregnation or tub-sizing method.

(3) Other Synthetic Resins

In the wet strength literature mention is found of synthetic resins other than urea-formaldehyde and melamine-formaldehyde. Some of these are objectionable for reasons of odor, color and difficulty of making and handling of aqueous solutions. More important, however, is the fact that urea-formaldehyde and melamine-formaldehyde are in a class by themselves in reactivity under papermaking conditions. As a result the other synthetic resins do not figure prominently in the wet strength field at the present time.

The Protein Group

Glue or gelatin may be used as bonding agents between the fibers of paper. Normally such bonding, although increasing the dry strength of paper, has little effect upon the wet strength. If, however, the protein is hardened or rendered insoluble, wet strength does result. Among the agencies for rendering protein insoluble, two have a position of importance in the wet strength field; namely, in-

solubilizing with formaldehyde, and insolubilizing by high temperature.

The hardening of glue used in tub sizing by means of formaldehyde was mentioned above among the older methods for obtaining wet strength. In contrast to urea-formaldehyde this process does alter the original characteristics of the sheet due to the effect of the glue itself. Thus it is natural that this process be used where greater stiffness, or a higher degree of inter-fiber bonding is desired, together with a less permeable surface. In the hydrolysis test described above, samples of this type of paper which have been examined show very nearly the same degree of hydrolysis regardless of *p*H. There is no region of high stability such as is found with the synthetic resins.

The insolubilizing of a protein bonding agent in paper by means of high temperature for a very short exposure time is described in a recent patent *(11)*. Samples of this paper which have been given the hydrolysis test, show a high and uniform resistance in the acid and neutral range, and a sharp loss in the alkaline range.

The Manno-Galactan Group

The water soluble manno-galactans of which locust bean gum is an example are excellent inter-fiber bonding agents, and when rendered insoluble by means of a mild alkali such as a calcium metaborate they produce wet strength paper. This process has been described in recent patents *(12, 13)* and research is going on with alternatives to locust bean gum. Samples of these papers which have been given the hydrolysis test show a narrow region of moderately high resistance just on the alkaline side of the neutral point, and a high degree of hydrolysis elsewhere on the *p*H scale. Since any material which increases the inter-fiber bonding materially affects other characteristics of the paper than wet strength, we find that this process tends to increase the dry strength and decrease the flexibility.

Miscellaneous Processes

As far as published records are concerned none of the other processes mentioned in Table II are of much commercial importance at the present time. It is evident from the nature of the materials that effects other than wet strength would be very prominent. Thus, with the cellulose ethers and esters, drying oil, and rubber latex, a high degree of water repellency would be expected. Also, since these materials would tend to bind the fibers more firmly together in the dry state, the changes that are characteristic of such action would be encountered.

Among the wet strength processes mentioned in the literature is treatment of paper with formaldehyde and acid *(1, 14, 15)*. A serious difficulty with this process is its tendering effect upon the fiber which results in loss of tearing strength and folding endurance.

For a very extensive survey of the wet strength literature the reader is referred to a recent article by Collins *(16)*.

In Table I data were presented showing the wet tensile strength of samples of various untreated papers. In Table III, similar tests are given for papers that have been treated by various wet strength processes.

TABLE III

Paper	Chemicals	Method of Application	Dry Tensile lb./15mm.	Wet Tensile lb./15mm.	Per Cent
Towel	Urea-formaldehyde	Machine impregnation	2.25	0.88	39
Lens paper	Melamine-formaldehyde	Beater	1.20	0.49	41
Kraft saturating	Urea-formaldehyde	Laboratory impregnation	14.9	6.8	46
Kraft wrapping	Melamine-formaldehyde	Beater	26.5	6.9	26
Towel	Protein insolubilized by heat		5.3	1.39	26.2
Towel	Locust bean gum	Beater	4.64	0.78	16.7

Wet Rubbing Resistance

There are two distinct ways in which the wet strength property may become manifest. For example, there is the resistance to rupture in the wet state as revealed by tensile or burst tests. There is also the resistance to disintegration by rubbing or scuffing when wet. These two properties follow each other rather closely but not always exactly.

The study of the wet rub resistance of wet strength papers discloses some interesting results. Unfortunately, there is no standard method for the determination of wet rub of paper quantitatively. The author has made determinations of wet rub by finding the weight that must be applied to a bristle brush in order to pull fibers out of the surface of a wet sheet of paper when the brush is pulled across it. Another method used by the author consists in finding the number of rubs necessary to wear through a wet sheet of paper by a reciprocating rubbing machine. These two methods give fairly good relative results although individual tests are not as reproducible as desired. These tests indicate the rather interesting result that when a five-fold increase in wet tensile is produced by a synthetic resin such as urea-formaldehyde, a forty-fold increase in wet rub occurs. Whereas the quantitative evaluation of wet rub is not very satisfactory, the comparison of one sheet directly with another is quite simple and is a very sensitive test. It is only necessary to wet the two sheets to be compared, take one in each hand and rub them together. It is easy to observe which is superior to the other.

An interesting application of the direct comparison wet rub test which highlights the ability of the synthetic resins to confer wet rub resistance is as follows: one sample was an unsized saturating kraft of basis weight of 50 pounds, a dry tensile (15 mm.) of 14 pounds, and a wet tensile of 1.2 pounds. The other sample was a creped towel of 38 pounds weight, 3.0 pounds dry tensile and treated with urea-formaldehyde to a wet tensile of 1.2. Thus we had two samples of paper with the same wet tensile, but in one case the wet tensile was due to the naturally high strength of the sheet itself, while in the other case the wet tensile was increased about five times over that inherent in the paper itself. It is also to be noted that the surface of the kraft was hard and smooth, making it naturally resistant to rubbing, while the soft creped surface of the towel was naturally very susceptible to rubbing. When the two were rubbed together the towel quickly demonstrated its superiority over the kraft.

This test not only emphasized the tremendous effect that synthetic resin wet strength has on wet rub resistance, but it also shows that a wet tensile or wet mullen test may be misleading in the case of strong, heavy papers when one of the important use requirements of the paper or board is wet rub resistance. This may also be of some importance in the case of boards which have a high "wet mul-

(Concluded on page 48)

How to Maintain Motor Starters in Paper Mills

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▸▸▸ ELECTRICAL EQUIPMENT in the pulp and paper industry must operate on a continuous 24 hour per day schedule under conditions far from favorable. Excessive moisture, paper lint, chemical dust and fumes, are usually present and attack exposed and unprotected electrical parts.

Maintenance of this electrical equipment presents an operating problem, the solution of which is of the utmost importance to the industry. An adequate and well supervised inspection and maintenance program will go far toward improving operating efficiency and in making existing equipment last for the duration.

Satisfactory maintenance of electrical equipment requires competent men and a thorough and adequate plan of handling the inspection and repair work. Good inspection and prompt repairs will avoid high maintenance costs; complete replacements will often be avoided; lost time will be kept at a minimum.

Preventive maintenance begins with the proper selection of the motor starter. If it is not suitable for the installation or if it has insufficient capacity, maintenance troubles are inevitable. The initial inspection of a new installation should be thorough and operation observed at load conditions before final acceptance is made. A time schedule for routine inspection should be established to meet the service requirements. As motors and their starters are always associated, a combined schedule can require inspection of both.

Do Not Lubricate Bearings

Oil and grease never should be applied to the bearings of a contactor or relay. Experience has indicated that oil or grease will cause dirt to accumulate and eventually result in a sticky, gummy accumulation that causes sluggish action. The bearings are designed with these requirements in mind and no lubrication is required on any part.

Bearing parts should permit contactors or relays to operate freely and without apparent friction. If parts are out of alignment and excessive friction does exist, it should be eliminated. Sluggish action will cause electrical troubles. Monthly inspections for severe service and semi-annual inspection for average service will do much to prevent bearing and friction troubles.

No bearings are required when the moving parts of a contactor or relay are relatively light and the magnetic forces can be made strong enough to lift the movable parts vertically to close the contacts. This is an ideal design as far as bearings are concerned. However, the moving parts must be guided within the solenoid and non-magnetic guides must be used to prevent magnetic sticking and sluggish action.

Replace Badly Pitted or Thin Contacts

Although contacts are generally thought to be subjected primarily to electrical duty, the mechanical duty is equally important. Endurance tests are made with no current through the contacts to observe how well they withstand the pounding, rolling and sliding or scrubbing action that occurs every time the contacts close. Contactor designs often provide a rolling action of the contacts so that the circuit is closed and opened on the contact tips instead of on the closed contact position.

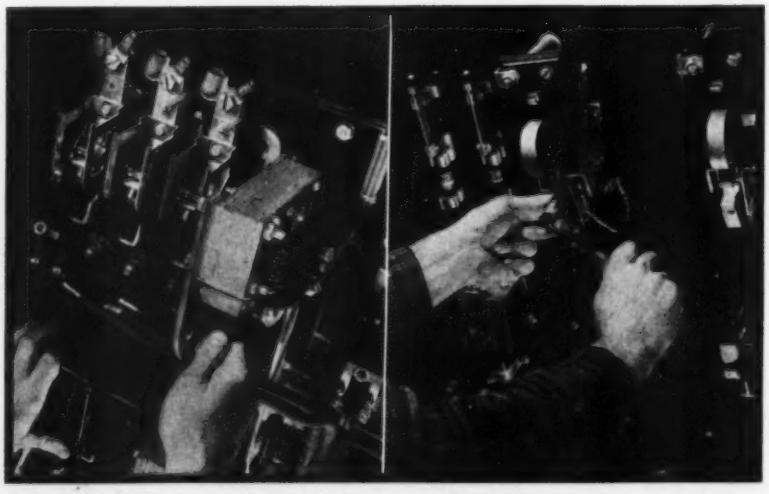
When high currents that are difficult to interrupt are expected, powerful arc rupturing structures are supplied to force the arc off the contacts and quickly extinguish it. These arc-rupturing structures are called arc boxes or blow-out structures. When in operating position, they completely surround the contacts and must always be in correct position to rupture the arcs effectively. They are easily removed for inspection or replacement of contacts. If they are not returned to proper position after inspection, the arc will not be properly broken and the contacts will be unnecessarily worn and burned.

Contacts should be renewed when badly burned or pitted and when worn thin. They should be clean but need not be smooth. In fact, a clean contact with a roughened surface comparable to coarse sandpaper is satisfactory and provides as good or better contact surface than perfectly smooth surfaces. If a contact surface is pitted or burned and not worn thin it can be cleaned and used again.

The method of cleaning is important. Coarse and crude filing wastes material and is generally done without sufficient care to maintain the original contact shape. The contact surfaces then have high spots and point contacts that are apt to overheat. Instead, clean with sand-paper or by buffing wheel. A fine file is permissible if the contact shape is maintained. Emery paper should never be used as particles may adhere to the surface and cause unnecessary wear.

Silver contacts seldom require clean-

(1) Industry Engineer, Paper Mill Section, and (2) Motor Control Engineer.



LEFT—Moving parts of contactors and relays must move freely and without evidence of undue friction. Bearings are made for severe duty and should not be oiled or greased. RIGHT—Contacts worn through by long use or badly burned contacts must be renewed. Surfaces against which contacts are bolted should be cleaned. Clean copper contacts, though slightly roughened, are entirely satisfactory. Silver contacts, though black in appearance, need not be cleaned. Be sure contacts are tight at all times.

LEFT—Defective coils must be replaced. Designs are usually made so that coils may be changed easily and without much delay. RIGHT—Arc shields must be in correct position. A misaligned arc shield will seriously decrease the arc interrupting ability of the entire blowout structure and may interfere with the opening and closing of the contactor.

ing. They may look black and dirty because of the silver oxide but as the oxide is a conductor, cleaning is not often necessary.

When contacts are replaced, the surface against which they are bolted should be thoroughly cleaned. This is usually a current carrying joint and a clean contact bolted to a dirty surface cannot give best results. Both surfaces should be clean. Any traces of copper oxide should be removed.

The screws or bolts that hold contacts in place must be tight at all times. A loose contact surface offers high resistance and develops heat. This causes increased oxidation of the coppor contacts. As copper oxide is not a good electrical conductor, this oxidation creates still additional resistance and heat. This action is cumulative and eventually causes contacts to melt and deterioration of the entire contact assembly.

When contacts open and close the rolling and rubbing action combined with the slight burning of a normal arc combine to keep the contacts bright and clean. If the contacts operate infrequently, the cleaning action does not occur and a covering of copper oxide develops. The heating-oxidation cycle may start and eventually overheating may develop even though the current or load is normal or less. For such conditions, silver contacts will probably give better service as silver oxide is a good conductor and heating does not develop. Silver contacts may also provide some relief in cases where a small overload condition is troublesome. They must, however, be used with some caution because they will not correct overheating caused by loose connections. As silver has a lower melting temperature than copper, silver contacts are more prone to become soft and "weld" or "freeze" together when subjected to high arcing temperatures.

Other special alloy materials are available that give reasonably good service under certain unusual or specific conditions. Contacts made of special materials should be used only on advice of the manufacturer of the device. Usually they are rated at lower current carrying capacities than similar contacts of copper or silver.

Importance of Contact Pressure

The closed pressure of contacts is an important factor in their ability to carry current. A small contact with suitable contact pressure will carry more current than a larger one with little or no pressure. Renewal of thin contacts is required, as with wear they lose their contact pressure. It is important to keep the contact springs in good condition. Replace them if they have been damaged or have lost temper through exposure to high arcing temperatures.

A monthly inspection of contacts for pressure, available life, surface condition, temperature and tightness should be sufficient for normal conditions. For severe operating conditions a weekly inspection may be advisable.

Renew Frayed Shunts

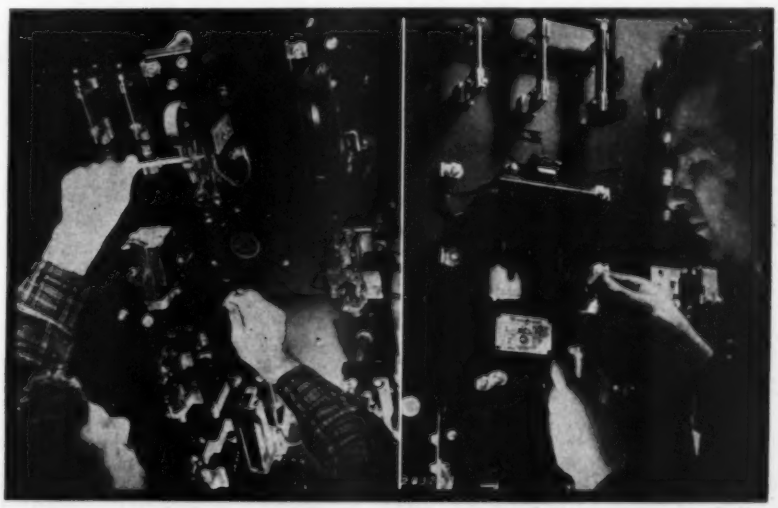
Shunts are generally flexible bands of woven copper strands that carry current from the movable contacts to a stationary stud. If the shunt is unduly bent its strands break and cause additional loading of the remaining strands.

Shunts with broken strands should be renewed to prevent overheating. The terminal connections of the shunt should be tight. Shunt ends are frequently silver plated or covered with special finishes to insure a clean contact surface of good current carrying ability.

Coils Should Operate at Rated Voltage

After coils are wound they are treated with insulating varnish to improve their di-electric strength and make them a solid mass. This makes the coil less susceptible to mechanical injury, eliminates air pockets within the winding and enables the coil to radiate heat more readily than an untreated coil.

Alternating-current coils are designed to withstand 10 per cent overvoltage and operate the devices at 85



LEFT—Contact pressures are very important and should be checked. Weak springs and overworn thin contacts will reduce contact pressures. RIGHT—The working parts of dashpots are machined to small clearances. They should be kept clean. Parts should move freely without friction. Correct oil should be used and oil level should be correct.

per cent of normal voltage. Direct-current coils will withstand 10 per cent over-voltage and operate devices at 80 per cent of normal value.

Over-voltage operates a contactor or relay with more mechanical force and tends to shorten the mechanical life if allowed to prevail. Over-voltage also shortens the life of a coil because it operates at a higher temperature. Low voltage will cause sluggish action. The contact tips may touch but not be forced completely closed against the contact spring pressure. Under such conditions the contact tips will most certainly over-heat and probably "weld" together. Contacts must always seal closed.

On a-c service, the coil current is much higher while the contactor is closing than after it is closed. A-c coils are not designed to stand the open-gap or closing current continuously. If any mechanical interference prevents complete closure of the magnetic air-gap of an a-c device, its coil will soon be over-heated.

Open-circuited coils are easily detected because they cannot operate the device. A voltmeter connected across the coil terminal would show zero voltage. A coil with some turns short circuited might operate, but it would soon over-heat and burn out. Most designs permit quick and simple replacement of a defective coil.

Check Chart for Motor Starter Trouble

Trouble	Cause	What to Do
Contactor or relay does not close	No supply voltage	Check fuses and disconnect switch
	Low voltage	Check power supply. Wire size may be too small
	Open circuited coil	Replace
	Push button contacts not making	Clean and replace if badly worn
	Interlock or relay contact not making	Adjust and replace if badly worn
	Loose connection or broken wire	Check circuit with "flash light" (turn off power first!)
	Overload relay contact open	Reset
Contactor or relay does not open	Push button not connected correctly	Check connections with wiring diagram
	Shim in magnetic circuit* worn allowing residual magnetism to hold armature closed	Replace
	Interlock or relay contact not opening circuit	Adjust contact travel
	"Sneak" circuit	Check control wiring for insulation failure
	Contacts weld shut	See "Contacts Weld Shut"
Contacts weld shut	Insufficient contact spring pressure causing contacts to burn and draw arc on closing	Adjust, increasing pressure. Replace if necessary
	Rough contact surface causing current to be carried by too small an area	Smooth surface and replace if badly worn
Arc lingers across contacts	If blowout is serious, it may be shortened If blowout is shunt, it may be open circuited	Look at wiring diagram and see kind of blowout. Check to see if circuit through blowout is all right
	If used, arc box might be left off or not in correct place	See that arc box is on contactor as it should be
	If no blowout used, note travel of contacts	Increasing travel of contacts will increase rupturing capacity
Noisy A-C Magnet	Improper seating of the armature	Adjust
	Broken shading coil	Replace
Excessive corrosion of contacts	Chattering of contacts as a result of vibrations outside of the control cabinet	Check control pressure and replace spring if it does not give rated pressure. If this does not help, move control, so that vibrations are decreased
	High contact resistance because of insufficient contact spring pressure	Replace contact spring
Abnormally short coil life	High voltage	Check supply voltage and rating of controller
	Gap in magnetic circuit†	Check travel of armature. Adjust so that magnetic circuit is completed
	Too high an ambient temperature	Check rating of contact. Get coil of higher ambient rating from manufacturer if necessary
Panel and apparatus burned by heat from starting resistor	Motor being started too frequently	Use resistor of higher rating

Dead Center Opening Reduces Mechanical Vibrations

When a magnetic contactor opens, the movable part strikes the stationary stop rather forcibly. There is a "dead," or center of percussion point at which the effect of the blow is nullified. If the striking occurs at some other point, the device is subjected to mechanical vibrations and strains that reduce its mechanical life. This feature is vividly illustrated by the "sting" of a baseball bat if the ball strikes near the end.

Dirt or Rust May Be Cause of Excessive Noises

D-c contactors always operate quietly when closed. A-c contactors may be noisy.

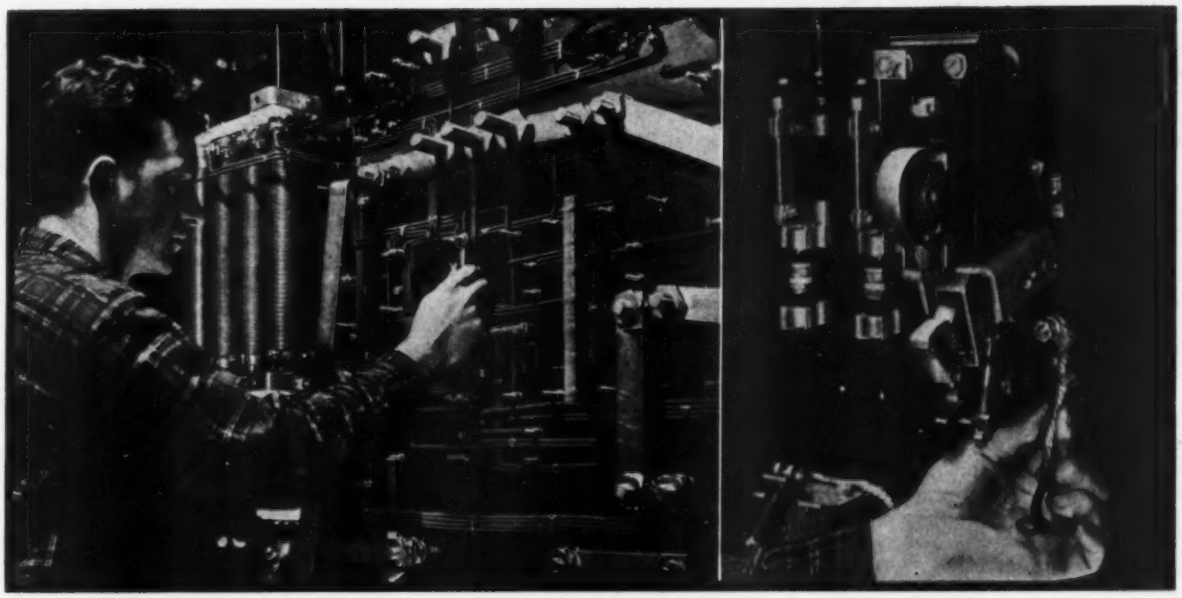
The laminated magnetic structure, necessary on a-c designs, must be held tightly together by screws, rivets or other means. If the laminations become loose the assembly will be noisy.

Noise will also result if the movable and stationary pole pieces do not fit well together when the device is closed. Dirt or rust may prevent proper closure of these surfaces and cause objectionable noise. To prevent rust on these fitted surfaces during shipment some grease is applied. The excess grease should be removed when placed in service to eliminate a "sticking" or sealing effect when the surfaces are first closed against each other.

The most important device in reducing noise of an a-c device is the shading coil usually imbedded in a part of the laminated magnetic structure. This coil is often a single turn of wire or strap and if broken the noise will be most objectionable. If contactor is noisy, look first for a broken shading coil.

Oil-Immersed and Explosion Tested Control

For high-voltage installations, in explosive atmospheres and areas of corrosive nature, such as acid fumes, the entire equipment is often completely immersed in oil. The oil should be maintained at proper level and should be kept clean, especially when used for



LEFT—All connections must be kept tight at all times. Loose connections are a frequent but very elusive cause of operating troubles. RIGHT—Broken strands of shunts cause the remaining good strands to carry more current and eventually overload the shunt and cause it to overheat. Damaged shunts should be renewed.

insulating purposes. A monthly inspection of oil-immersed equipment is adequate unless service is severe and the oil deteriorates rapidly.

"Explosion Tested" starters are intended for use in explosive atmospheres and do not require oil. These starters are built to specifications of the Underwriters' Laboratories. The enclosing cases are built to withstand high pressures that occur within the case if internal explosions should occur and to prevent flames escaping into the explosive atmosphere. If dismantled, the parts of an Explosion Tested starter must be carefully assembled to be sure that all bolts, nuts and joints are tight. Operation in the explosive area, unless properly and completely assembled, is not permitted.

Since many parts of contactors and relays are made of steel and subject to rust, these parts are always covered with a protective coating such as zinc or cadmium plating. Copper and brass parts are often treated with a light finish to protect against oxidation and for sake of appearance. Steel cabinets are painted; small sizes often have baked finishes. Galvanized sheet is often used to give added assurance against corrosion.

Relay Operation Dependent on Proper Liquid in Dashpot

When oil or any liquid is used in dashpots, regular inspections should be made to be sure that the dashpots are free of friction and the proper oil level is maintained. No substitution of oil or liquid used in dashpots should be made. These liquids are tested for certain characteristics such as change in viscosity with temperature changes. A change in oil or liquid would therefore affect the operation of the relay.

Thermal relays are subject to ambient temperatures and should be in a room temperature equivalent to that in which the motor is located. Otherwise the relays may not operate to the best advantage. For example, a thermal overload relay should not be in a temperature much in excess of the motor room temperature unless proper allowance for the difference in temperature is made when the thermal heaters are selected.

Connections Must Be Tight and Clean

Loose connections are a frequent cause of trouble. They result in overheated parts that eventually must be replaced. Once tight does not mean they will remain tight. Periodic inspection is necessary. Changes in temperature, vibration and carelessness are all common causes of poor connections. They should always be tight and clean.

Resistors frequently fail from excessive temperatures. Over-heating may be caused by insufficient ventilation, excessive current or more continuous service than was anticipated in the design. Loose connections often cause local heating with eventual burned connectors. Grid or case types sometimes break in handling or with frequent and sudden overheating and cooling.

Keep Starters Clean and Dry

Moisture, dirt and dust are constant sources of trouble as they reduce insulation values of insulated wires and cables. They constitute a leakage path across which breakdowns occur from points of different potentials that would never occur on clean and dry surfaces. Routine maintenance should remove dirt and dust by blowing with dry compressed air, wiping or washing with suitable cleansing fluid. Compressed air under too much pressure may drive metallic dust and dirt into insulation or lodge particles between stators and rotors of motors or in moving parts of contactors and relays.

Moisture may occur from condensation, humid atmospheres, spray or overhead dripping. Heaters are sometimes placed in enclosures to keep the interiors dry. They are generally arranged to be automatically effective when the equipment is idle because the normal heat of resistors and coils is sufficient while in operation. Drip-proof, watertight and dust-tight enclosures may be provided.

Moisture in conduits is a frequent source of grounds and other trouble. Grounds cause false circuits that cause unexpected starts, prevent stopping by normal means, eliminate overload protection and cause unsatisfactory operation. Any measures to prevent moisture in conduits are good insurance against trouble. When serious grounds develop, they are eliminated by cleaning the conduit and installing new wiring. The insulation resistance should be checked regularly so that the pres-

ence of grounds can be detected and if possible eliminated before trouble occurs.

All wiring should be kept in safe and good condition. Vibration will cause broken wires. Oil, moisture, dirt and grease cause insulation breakdowns. Chafing or rubbing against unprotected edges soon wears away all insulation at that point. Temporary wiring is hazardous. Nuts and lock nuts should be tight. Defective wiring is an outstanding cause of electrical trouble and fires. Regular inspection is necessary.

High temperature is a sure sign of trouble. However, one must be sure that the temperature is excessive. To touch a cabinet or coil or motor and decide it is too hot is not a safe procedure because safe operating temperatures are often higher than one can comfortably "feel" with the hand. The best procedure is to know what temperature is considered safe and then actually measure it.

Here are the high points that should be checked to keep motor starters in good operating condition. They must be free of oil, dirt and moisture. No oil should be used on contacts or bearings of contactors and relays. Connections should be tight and wiring should be safe. Movable parts of contactors and relays must move freely and without friction. Contacts should be clean and tight with correct pressure and not worn too thin. Arc-rupturing devices must be in operating position.

Proper maintenance, as outlined in the foregoing, is important even in normal times. In these times when our war effort is demanding most of our critical materials, our manufacturing facilities and our manpower, the importance of an adequate maintenance program cannot be overstressed. Such a program will do much toward maintaining peak operating efficiency and making existing critical materials last for the duration.

Wet Strength Paper

(Continued from page 41)

len" after an exposure to water for a certain length of time due to their sizing or resistance to wetting. It is possible that the surface will show little rubbing resistance, in spite of the high mullen.

In another case the wet rub resistance of two samples of towel paper was compared. The wet strengthening agent in both cases was urea-formaldehyde and the wet tensile of the two was approximately the same. One sample, however, had been impregnated with a resin solution, while in the case of the other the resin was added to the stock. The impregnated sample was superior to the other. However, the wet rub of both was so immensely superior to the untreated paper that the difference was probably of little practical significance.

Factors in Selecting a Wet Strength Process

In conclusion it may be of interest to enumerate the factors that the papermaker must consider in selecting the proper wet strength process to do a particular job. These factors cover the necessary or desirable properties of the product, the technical and manufacturing conditions which prevail, and economic conditions including patents. These three must be viewed together since all are usually involved in the individual factors.

1. Degree of wet strength required. By this is meant the per cent of wet strength in relation to dry strength. A high degree of wet strength practically dictates the use of one of the synthetic resins.

2. The degree of permanency or resistance to hydrolysis required. This demands a careful study of the use requirements of the product and aging tests. The choice here will involve both the wet strengthening chemicals and the presence of hydrolyzing agents in the paper such as acids, alkalies and hygroscopic materials.

3. The importance of other paper characteristics such as softness, absorbency, tearing strength, and folding endurance. These involve not only the selection of wet strength chemicals but also the method of application.

4. The relative importance of, and the facilities available for, broke disposal. In general, ease of broke disposal is contradictory to permanency mentioned in 2.

5. The relative importance of wet rub in contrast to wet tensile and wet mullen. This involves a number of things including the wet strength chemicals, the degree of wet strength, the method of application, and the character of the base sheet.

6. The manufacturing equipment available. This will have a bearing on the use of a method involving stock treatment or a method involving sheet impregnation.

7. Facilities for applying heat to the paper on the machine. All available wet strength processes require heat in addition to mere drying if the proper development of wet strength is to occur on the paper machine.

8. Control of fumes. It will be noted that formaldehyde is an ingredient in many of the processes, and fume trouble may be encountered if ventilation is inadequate.

9. Technical and operating skill and experience available. The availability of such skill may enable the papermaker to prepare his own resins and operate the more difficult sheet impregnation method, both with economic advantage.

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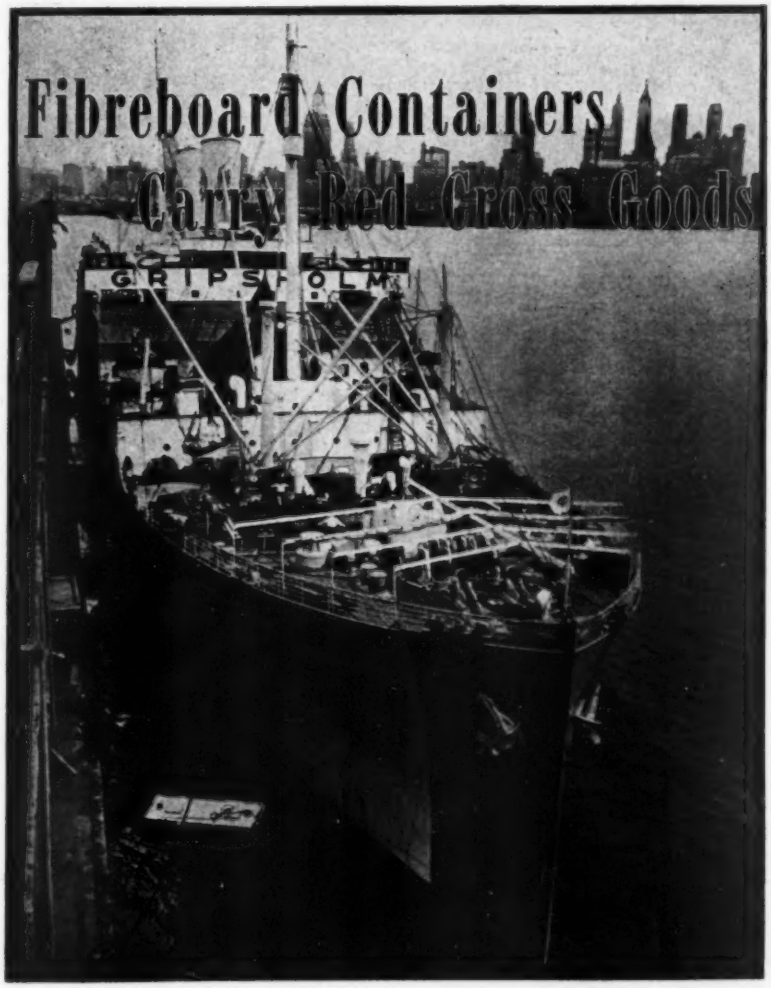
Reabsorption

It is not too soon for foremen, supervisors, and department heads in our factories, our mines, and our utilities to be thinking about their responsibility in connection with the reabsorption of the hundreds of thousands of young men who will be coming back at a steady rate as long as the War is on and who will come back in floods when Victory is won.

Our supervisors will play one of the most important parts in the reabsorption of these men. The impression that they get of the industry to which they return will be mostly from the supervisors who take them in charge. These returning men, if treated with proper consideration by supervisors, will be helped to feel that their sacrifices have not been in vain. (*Management Information,* published by Elliott Service Company, Inc.)



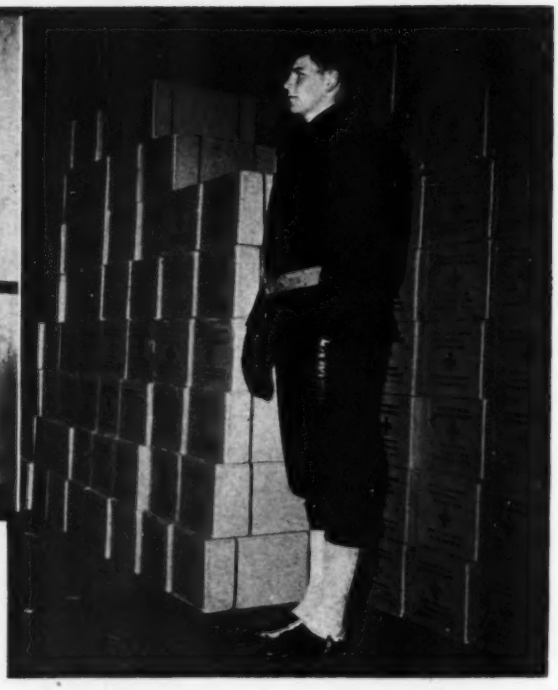
▸▸▸ EVERY AMERICAN SOLDIER held prisoner in Axis Europe last Christmas was the recipient of a special package of seasonal delicacies provided through the American Red Cross. Wrapped in gaily decorated gift paper and packed in substantial fibre cartons, these parcels carried canned chicken, fruit cake, candied nuts and fruits, peanut butter, cheese, jam, coffee, chocolate, cigarettes, a dozen colored candles, and two handkerchiefs.

Thus did the paper and fibreboard industry have a share in helping to provide a happy Christmas to the men who wait behind barbed wire for the dawn of peace. But that Christmas shipment is only a small part of the story, albeit important. Fact is that, all-told in 1943, a total of 7,405,088 Red Cross food parcels, each containing at least eight pounds of food, snugly packed in fibreboard cartons, were shipped from this country to Geneva for distribution to American and United Nations prisoners of war. And, for convenience in handling, four of these boxes are packed in a larger carton which is sealed with steel straps.

Each week every American prisoner definitely located in a permanent

The Gripsholm, international exchange ship, lying at her dock in New York, being made ready for another voyage of mercy carrying supplies, clothing and food to prisoners of war and bringing about 1,500 exchange passengers. (Official U. S. Navy photo)

LEFT—Red Cross blood plasma on way to destination. New Guinea Papuan natives carry blood plasma, processed from blood contributed at American Red Cross blood donor centers, to its destination. The natives are employed to carry supplies to the evacuation stations just behind the front lines and are given a large measure of credit for Allied successes there. (Photo by Harry Poague, Red Cross correspondent) RIGHT—Photo taken at the opening of the American Red Cross prisoners-of-war packing center at 39 Chambers Street, New York City. Nine chapters in the Metropolitan area supply volunteers to run two shifts daily. (Photo by Tommy Weber, New York City)



ABOVE—Somewhere in Germany . . . Red Cross parcels arrive at Stalag. RIGHT—Coast Guard protects Red Cross prisoner-of-war food parcels. These are just a few of the health saving parcels prepared at the new American Red Cross packing center in Philadelphia for shipment to American and other United Nations' fighting men captured by the Axis. They are ready to be loaded on the International Red Cross Committee's prisoner relief ship Caritas I for dispatch overseas. (American Red Cross photos)

camp in Europe receives one of these standard Red Cross food parcels. The millions of others which were shipped were distributed to United Nations prisoners of war, 700,000 of them in time for Christmas last December.

These parcels are packed by trained volunteers at Red Cross centers in New York, Philadelphia, Chicago and St. Louis. Though they are packed, shipped and distributed by the Red Cross, the vast majority are paid for by the U. S. Army and Navy, by governments in exile, various national relief societies and lend-lease.

Contents of the standard Red Cross food parcels are different from those distributed at Christmas. They contain powdered milk, cheese, dried fruit, oleomargarine, biscuits, chocolate bars, corned beef, liver paste, salmon, coffee, cigarettes and candy. For distribution in the Far East the Red Cross has devised a special package weighing 14 pounds, with a greater number of meat products included. A total of 140,000 of these parcels were sent to the Far East on the diplomatic exchange ship *Gripsholm* last fall. The Red Cross is fully prepared to ship additional packages at any time arrangements can be made.

Distribution of these parcels for prisoners of war is undertaken by the International Red Cross Committee and its appointed delegates. These delegates visit prison camps at periodic intervals, assure themselves deliveries are being made, inpect living conditions and, in general, see that agreements concerning treatment of prisoners are being observed.

Although this program is important, there is an even more vital Red Cross program of interest to the fibreboard industry. That is in the Blood Donor Service.

Blood plasma, manufactured from whole blood donated through the Red Cross, has been given credit by the Surgeons General of the Army and Navy for being one of the three principal factors in keeping deaths due to wounds to the barest minimum. Last year 4,200,000 blood donations were received by the Red Cross. These donations, rushed to biologic laboratories, were processed into plasma and serum albumin for use as blood substitutes in giving transfusions. Serum albumin, which is more concentrated than plasma, comes in liquid form. Plasma, on the other hand, is put up in powdered form. Packed with a bottle of distilled water and the necessary tubing and needles, it requires but a few moments to mix and administer.

A bottle of powdered plasma and one of distilled water, each sealed in a tin can, are packed in a fibreboard container to compose one unit. These fibreboard boxes have been shipped to every fighting front; they are on our ships at sea and they are stored at strategic spots along our coasts. Their contents have saved thousands of lives and even greater results are in store for the future.

Fibreboard cartons are used in many other phases of Red Cross activity. Millions of surgical dressings are being made by Red Cross volunteers every working day. They are shipped to Army and Navy medical depots in fibre cartons. Supplies for distribution to our soldiers and sailors by Red Cross field representatives and hospital workers in many instances are packed and shipped in fibre cartons.

The pulp and paper industry is doing a big job in this war. It is making large contributions to the success of every phase of the national effort. But few will gainsay the fact that not the least of these is the part it is playing in helping the Red Cross to carry on its humanitarian activities.

EDITOR'S NOTE: This article was prepared by the American Red Cross National Headquarters, Washington, D. C.

"Humanity and Neutrality" is the watchword of the Red Cross Societies.

The Foreman's Part *in* Better Labor Relations

▶▶▶ A VERY WISE EMPLOYER told me the other day, "We have never encountered a single instance of labor trouble which could not have been prevented if we had had the right kind of foremen on the job. We see now that the way to prevent *future* situations is by selecting foremen who can lead as well as boss—and who can live up to the management and labor relations responsibilities which go with their title."

I agree with him a thousand per cent. Show me *any* plant where the foremen really perform the functions which belong to their job—and perform them well—and I will show you a trouble-free factory. One reason it will be trouble-free is that uniform high-quality foremen don't "just happen;" having skilled, properly-trained, competent supervisors throughout the works is a desirable goal that can be attained only as a result of sound management policy. And when it comes to the selection of foremen, the average company just hasn't any policy. Instead of regarding foremanship as a specialized branch of management, the average firm appoints its foremen on wholly irrelevant grounds. "Tim Smith has been with the company for 23 years. Make him the foreman." Or, "Bill Jones has been the top producer in that department since the war began. He's the man to promote to foreman."

I call these factors irrelevant because being a faithful workman or a marvel of production efficiency has practically nothing to do with being a good foreman. Some of the best foremen in industry today never worked in a factory before Pearl Harbor, and not all of these possess more than average mechanical ability. What do they have that the hard-boiled foremen of the old school lack? For one thing, they have foremanship ability—and were chosen for that reason. For another, they have been trained to become foremen, and they regard their position as a special craft—almost a profession. They take pride in their four-fold relationship to the workers in their charge, serving them as: (1) instructor; (2) director; (3) interpreter, and (4) friend.

The successful foreman appreciates the true significance of *morale* as a production factor. In carrying out the major duties enumerated above, he treats the workers in his charge as human beings with rights and dignities and privileges—regarding himself as their leader rather than their boss. He would score at least 400 in Glenn Gardiner's famous test, in which 100 is given for an affirmative answer to each of the following questions:

O. C. COOL, Director
Labor Relations Institute

1) Do you know and call each worker by his first name?

2) Do you know the marital status, number of children, years of schooling and at least one outside interest of each worker under you?

3) Do you *always* ascertain a worker's viewpoint before making a decision affecting his interests?

4) Do you *always* give full credit for the worker's ideas and suggestions?

5) Do you get more satisfaction from praising workers than from "bawling them out"?

To the old-type foreman these questions would smack of molly-coddling—on the tender side rather than the tough, and therefore just another silly notion of management. But one big company (Western Electric) made a test which actually proved that the *attitude of the foreman* is the basic fundamental of good working conditions. This firm took a group of employees and surrounded them with everything that could make their duties pleasurable, and discovered that pleasant physical surroundings, perfect lighting, fine toilet facilities, rest periods, snacks during work hours, etc., really increased output very little. But when the emphasis was shifted to *improving the nature of the supervision*—how the workers got along with the foreman, whether they were treated equally and praised for doing good work, production soared. In short, you can modernize a plant all you please, but it will do little good if the foremen still live in the Middle Ages.

There are other proofs that quality of supervision is of top-flight labor-relations importance. J. David House, for instance, demonstrated through testing that employees in general rate their wages *seventh* in a scale of values. They put the following six points ahead of the weekly pay check:

1) Receiving help necessary to get results expected by the management

2) Being encouraged to offer suggestions and try new methods

3) Being told whether their work is improving

4) Certainty of getting a fair hearing and a square deal for grievances

5) Certainty of promotions going to those who are best qualified

6) Being encouraged to seek advice

With the help and encouragement of management, every foreman can go a long way toward realizing the ideals expressed in these tests and surveys. An effective way to do it is through the 4-point formula, which helps the foreman to embrace the full range of his responsibilities, both to the company and to the employees in his charge.

1. The Foreman as an Instructor

Both in "breaking in" new employees and in preparing others for promotion to higher jobs, the foreman's function as an instructor is of key importance. Every worker wants to be employed at his highest skill, not only because of the higher earnings involved, but also because of the tremendous factors of self-respect and respect from fellow workers. The foreman or supervisor who patiently trains the members of his department, avoiding "show-off" tactics and patronizing gestures, is bound to win co-operation from his staff.

One of the fundamental mistakes in training is to assume that the new worker knows more than he really does about the particular operation, machine or material. Another basic fault is impatience on the part of the instructor, who, because the task is easy for him

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***EDITOR'S NOTE:** Mr. Cool was a labor relations consultant and successful business man before founding the Labor Relations Institute in 1938, since which time the organization has grown to a membership of 6,500 companies. In this article, as in his informal talks to industry, the author has given generously from the reports and surveys of The Institute's Field Staff—assuring up-to-the-minute, practical suggestions which will be of real value to every reader.*

to do, expects the novice to grasp everything at once. Time spent in explaining complete details, and in demonstrating, step by step, the task to be performed, is time invested. But there is no "pay-off" unless the worker fully grasps the teaching, and this means that the instructor must watch the learner do the job "on his own." It also involves constant, but friendly, checking up throughout the first day or so of work, to be sure that everything is fully understood. Allowance must be made for nervousness on the part of the beginner, and this explains why the foreman's instructing should be done in a manner which puts the new man at ease.

Of course, instruction is not confined to the actual task to be performed by the new workers. Every job is surrounded with details, such as how to get materials or tools, what to do if the machine breaks or needs adjustment; what the rules are regarding rest periods and relief; safety practices and regulations; checking in and checking out, etc. In the well-ordered shop, such details will be covered in the Employees' Manual or handbook given them upon induction, but the foreman who takes his responsibilities as an instructor to heart will not be content to let the new worker get it all from the book. Instead, he will discuss these points in his own way, using the manual more as supplementary text or for illustration. This treatment insures that the manual will be referred to, and not be regarded as so much "fine print." And if the manual doesn't lend itself to this practice, you need a new manual.

2. The Foreman as Director

Naturally, foremanship goes beyond instruction, which, after all, is a means toward an end. That end is sustained production at the minimum cost in money, time, material and effort. Quality is also an essential factor; it does no good to step up the production of parts if the percentage of rejects also rises. Wear and tear on workers is as costly as wear and tear on machinery; the good foreman develops a faculty for sensing what can and can not be done, so far as pace is concerned.

The ability to weld the individual workers into a team which functions smoothly as a unit is a touchstone of good supervision. This means that the foreman must have a harmonizing influence on the people who work under him. He cannot afford to ignore feuds or differences of opinion which lead to petty strife and bickering between the employees. Without offensively sticking his nose into other people's business, he must smooth out such tangles and irritations—or, if he finds that impossible—see that the inharmonious elements are transferred to other departments or other shifts. The practical jokers and the horseplay addict must be disciplined or separated, and the chronic complainers either satisfied or firmly dealt with (as must be done if their gripes are imaginary or unreasonable). The distinction must be drawn between the "natural-born faultfinder" (who gets in other workers' hair) and the employee with a sincere grievance.

Much of the literature on foremanship overlooks the foreman as an administrator who must deputize and delegate as well as one who directly supervises. The foreman who has to do everything himself, for fear that nobody else can handle it quite as well as he, is in as bad a position as the top manager who makes everything clear his own desk.

3. The Foreman as Interpreter

The foreman is a part of management, and a very important part, at that. He, more than anyone else on the management side of the organization, comes into daily—even hourly—contact with the employees. In fact, to most of the workers the foreman *is* the management. Upon his shoulders falls the burden of humanizing and interpreting the various company policies which affect the employees. He is more than a mere liaison officer, however; in nine cases out of ten his decisions are final, and while these decisions obviously must conform with company policy, they are the foreman's own actions, taken on his own authority and responsibility. The body of these decisions tend to be regarded as company policy as time goes on. So the foreman's acts, as well as his words, ultimately reflect "the Company" to the workers.

Foreman interpretation involves not only the explanation of company policy toward days off, minor infractions of rules and similar matters, but also the much higher type of action involved in handling grievances, when the foreman acts quasi-judicially. The measure of a foreman's capacity could well be his reception of complaints—whether he meets the employee halfway and tries to settle the matter equitably, or whether he resents the complaint as a reflection upon his own ability. To be fully effective, and to get the best results from the grievance machinery, the foreman should not merely *settle* complaints—he should invite them. The worker who finally speaks his mind must feel that the expression is well within his rights, and that no retaliation or discrimination will result. That is why the foreman hearing the complaint should lean over backward to assure the employee that he is listening to every word, and that all aspects of the matter are being given full consideration—with the employee's interest uppermost in the foreman's mind.

Some foremen dismiss the need for grievance systems by saying, "There isn't a man in my department who can't come to me and say anything he pleases." But they rob a grievance of its significance by being too casual about it. In short, they are acting as Bill Smith or Bob Jones instead of as management representatives. The good foreman is neither casual nor sarcastic in his dealings with his force; when faced with a serious complaint (and every complaint is serious to the complainer) his demeanor suits the occasion.

4. The Foreman as a Friend

Every progressive management wants to be considered the friend of all the workers, but it is obviously impossible for this to be literally true in all but the smallest companies. But the foreman, who is a part of management, certainly can be the friend of every worker in his department. He is the one person who knows everybody, and he can be either the amalgam which unites the group or the obstacle which keeps everyone apart. He is the one who sees when employees need help or counsel; if he is friend as well as foreman they will bring their troubles to him. He works with them and fights for them, and is combination counsellor and champion as the case requires.

This does not mean that the foreman should be too hail-fellow-well-met, or that he should feel it incumbent upon him to treat his subordinates as social companions. The distinction in rank should always be apparent, at least in the shop. The foreman who weakens his authority and prestige by needless fraternizing is no more a friend thereby—and certainlly less of a part of management. The Golden Rule is a surer foundation for friendship than trying to be "pals" with everybody.

Foremen Have Grievances, Too

One of the reasons why all foremen aren't measuring up to the standards named above is an indifference to their morale on the part of higher management. It is not exaggerating to say that in many companies the foreman has become almost a forgotten man. An investigation into the problem by the Field Staff of the Institute proved that many firms have been neglecting the fundamental rules of good foreman - employer - employee relations. Here is the gist of the foreman's com-

How Conciliation Works

WILLIAM B. SMITH, Chief, Magazine Service Section
Division of Information, U. S. Department of Labor

▸▸▸ TO THE UNINITIATED there is something almost miraculous about scientific discoveries. Brilliant invention has played a notable part, of course, but when we analyze the successive steps in these new discoveries we are apt to find that patient research and the application of tested principles have made the chief contributions.

Similarly, there is no magic formula which can be applied to labor-management disputes, but there are established procedures that point the way to a satisfactory settlement in the vast majority of cases. During the thirty years of its existence, the U. S. Conciliation Service has developed basic methods for handling such controversies. The underlying principle is not new—it is simply a recognition of the fact that these disputes are primarily concerned with problems of human relationship.

Last year, the Conciliation Service disposed of 21,775 situations; among them were 18,436 active disputes involving 10,580,501 workers. More than 89 per cent of these disputes were settled without any work stoppage. Just about every branch of industry was included in this total. The paper industry accounted for 250 controversies affecting 67,444 workers.

Before looking more closely at the pulp and paper manufacturing industry, let us see how the Conciliation Service is set up and how it operates, since this general picture will apply to any industry.

The field work of the Conciliation Service is carried on by some 300 Commissioners of Conciliation, as they are called. These men are stationed in key industrial and commercial centers throughout the country, but they seldom "stay put" for very long—new assignments keep this flying squadron of industrial peacemakers constantly on the move. An administrative staff in Washington, headed by Dr. John R. Steelman, is the nerve center for this co-ordinated activity.

The Service is divided geographically into five districts, each with its own regional director. As a rule, Dr. Steelman and the regional director issue instructions assigning the Conciliator to a particular case. They take into account the number of cases in the area, the location of the new case and the Commissioner's own familiarity with the industry that is involved.

How do these requests for help originate? They may come from any of three sources: Employers, employees, or occasionally, the public. Union representatives often contact the Service and many personal officers, acting for management, do likewise. Needless to say, it makes no difference which side takes this first step. Quite frequently both join in the request. At times, also, the Service may offer its assistance without a request when it is believed to be in the public interest.

This is a good time to point out that the Conciliation Service is not an enforcement agency. It can advise, suggest or urge, but it cannot order. The only big stick Commissioners carry is an appeal to reason.

Conciliators handle all types of cases —those that have reached the stage of a strike or lockout, as well as threatened strikes, controversies, and sundry disputes. Though issues involving wages and hours predominate, there are many other causes—working conditions, vacations, union recognition,

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The Foreman's Part . . .

plaints, plus the Institute's recommended treatment:

Complaint: "Other departments cut into our functions too frequently. As a result, we face lost prestige in matters which should be in our own domain."

Solution: Restore the foreman to his true function as the first line of personnel authority. Give him the right to approve new workers and suggest the discharge of any employee. Make him the first person to whom a grievance can be brought for settlement. When an appeal brings a reversal, let the foreman himself tell the employee. Consult the foreman in all questions pertaining to the earnings or transfer of workers in his department—and, above all, let your foremen know the extent and limitations of their authority.

Complaint: "We are supposed to be part of management, but we never know what management is thinking or planning."

Solution: Don't make it necessary for foremen to read the bulletin board in order to learn about the new rules. Always hold foreman conferences before making any substantial changes in company policy. Have the foremen, themselves, announce changes in company policy to their workers. If you use departmental bulletin boards, have all company notices signed on the bottom by the foreman of the department. Notices should instruct workers to ask their foremen for further data or explanations.

Complaint: "We share in the extra burdens of management, but our wages are not in keeping with the position we are supposed to enjoy. In some cases, workers under our supervision earn more than we do."

Solution: No foreman should receive less than 10 per cent more than the highest-paid worker beneath him. A margin of 15 to 25 per cent is even better. File with the Treasury Department for permission to restore these pre-war differentials in pay, pointing out that because of longer hours or greater responsibility the foremen are earning less proportionately. You can also file for a foremen's incentive plan, and at the same time can apply for permission to put the foremen on a salary basis, and to give them longer vacations and sick leave with pay.

Complaint: "We are supposed to be apart from the rank and file, but we get no distinctions in treatment that make this apparent to the workers."

Solution: The foreman should have a visibly distinct status in the eyes of the labor force. Hence the value of separate (not necessarily better) facilities for foremen, including washrooms and locker rooms, separate or private parking space, etc. Free the foremen from punching a time clock. Supply different badges, different-color pay envelopes. Encourage the foremen to keep together, and foster a team spirit and a foreman *esprit d' corps*. Just as in the Army, industrial "non-com clubs" have a distinct morale value.

The evidence presented in this summary of the foreman situation in industry today is far from complete. But it is sufficient to show that (1) foremen as a whole can do a great deal more toward cementing employer-employee relations and (2) that top management has plenty of room for improvement in its handling of the foremen themselves. If both segments of management will do their best to overcome the problem, the benefits will be visible and sure—and within short order.

collective bargaining, and seniority rights, to name only a few.

And by the same token, the attitudes of both parties may range all the way from mild disagreement over some technical question to such open hostility that neither side will speak directly to the other when the conference is opened.

A more typical conciliation case will have a history somewhat like this. The employer is notified by the union in his plant that the employees want certain changes in the existing contract. The list may include an hourly wage increase for everybody in the plant, plus additional advances of 5 or 10 cents for certain job classifications; a bonus for the night shift; vacations with pay; better working conditions and an improved safety program.

Some of the requests may be primarily for bargaining purposes; others may involve points the employees are firmly decided must be won. If management and labor already have machinery for handling disputes and grievances, the controversy often can be narrowed down to a few essential issues.

When this stage is reached and further negotiation fails to bring the two sides nearer agreement, it is a good time to ask the Conciliation Service to step in. Most requests are sent to Dr. John R. Steelman, U. S. Department of Labor, Washington 25, D. C. The message may come by wire or by telephone; it may go into detail about the nature of the dispute, or simply ask the Director to assign a Conciliator to the case.

The Commissioner's first job is to get a clear objective picture of the entire situation. Usually he begins by interviewing the disputants. If these talks indicate that a meeting of minds is possible or likely, the next step is to arrange a joint conference.

It requires tact and good judgment to "sit in the middle" of these meetings, especially when there is distrust and bad feeling across the table. Several years ago in a remote district, one Conciliator found that representatives of both management and labor had come to the conference room heavily armed. He broke the tension by taking out his own small pocket knife and tossing it onto the table.

And it goes without saying that Conciliators must avoid even the appearance of taking sides in any dispute. A large part of their effectiveness comes from the fact that Conciliators are impartial and usually enjoy the confidence of employers and employees. Quite often they are told privately what each side is willing to concede. Naturally this off-the-record information is very valuable to the person who is trying to promote an agreement. Simple as it sounds, the conference method solves the great bulk of disputes.

Frequently, however, when some issue of a technical nature has not been solved around the conference table, the Conciliator suggests that a study or survey be made by a Conciliator who has the requisite technical training. A study of this sort is only undertaken, however, when both employers and employees ask for it and the results, with any recommendation, are turned over to labor and management for their joint use.

The type of study or finding of fact made by the Technical Staff, of course, depends upon the question involved. If the problem involves work load, a time study may be made or the incentive plan reviewed. Various other problems require these technically trained men to assist in preparing job descriptions to be used as the basis of classifying employees or to help the parties with a job evaluation project. Last year the Technical Division extended its work into a total of thirty-five industries.

Voluntary arbitration is another method that Conciliators sometimes suggest in situations where joint conferences leave certain issues unsettled. Here, too, this step is not taken unless both sides approve and agree to abide by the decision. The Service has a staff of Commissioners with special arbitration training who hear cases and make awards. Under the Wage Stabilization Act, any wage award which provides for a change in wage rates is subject to review and approval by the National War Labor Board.

From time to time the Service appoints outside arbitrators—that is arbitrators who are not on the arbitration staff of the Service. Such appointments are often made where the contracts provide that the expenses and compensation of the arbitration shall be jointly borne by the parties. These outside arbitrators are carefully selected as to training and experience. Most of them are either lawyers or educators.

Last year the Conciliation Service appointed arbitrators in 1,115 cases. Their awards were rendered quite impartially on the basis of the evidence submitted. In almost every case the decisions were well received by both labor and management and the wage awards, with very few exceptions, were unanimously approved by the respective Regional War Labor Boards.

The request for an arbitrator may take several forms: A joint request directed to the Washington Office of the Service; a joint stipulation to arbitrate certain points signed while a Commissioner is on the scene; a request from management and labor (or either if the contract so provides).

When all of the issues of a case involving the war effort have not been settled by a Commissioner of Conciliation, the case may be certified to the War Labor Board. Last year the Conciliation Service settled 15,051 labor disputes. During the same period it was necessary to certify 3,955 cases to the War Labor Board.

In this connection, it should be said that many labor and management groups may prefer to be ordered by a Government agency to make a settlement because they would rather have the record show that they were ordered than that they agreed voluntarily. Often they also feel that an enforced settlement will be more favorable than one to which they voluntarily agree.

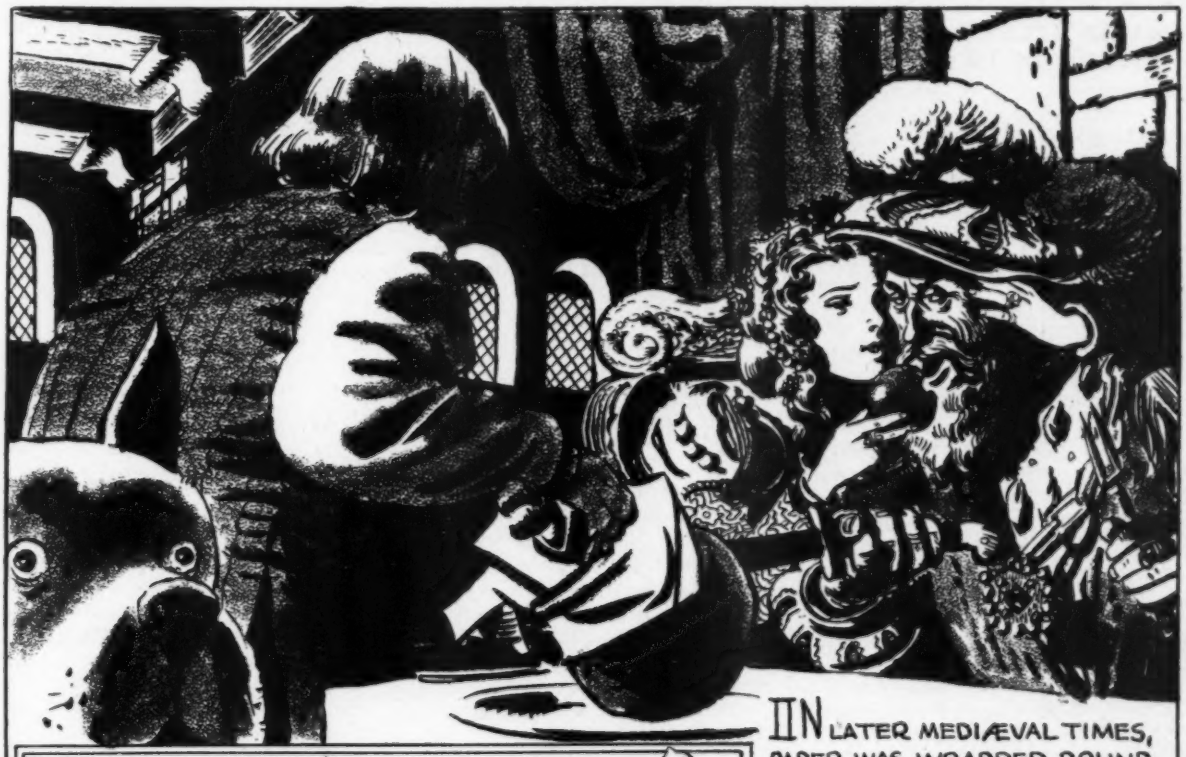
While industrial management and labor have developed a broader understanding of their common interests during the war, this period also has produced an atmosphere of greater tension that makes conciliation more difficult. So much of our environment is saturated with the spirit of war that little room is left for calm decisions based on economic facts. The pressure of wartime production has imposed new stresses and strains on management and labor alike.

With this general picture of the Conciliation Service in mind, it is time to look directly at the pulp and paper manufacturing industry. During the past calendar year the Service handled 303 situations involving 70,672 workers in this industry. In this total were 250 active disputes embracing 67,444 employers. In the period from July, 1943, through January, 1944, the Service found it necessary to send 36 cases involving 13,473 workers to the War Labor Board.

As might be expected, the disputes in this industry followed the general pattern. Questions involving wages touched off the majority of disagreements. In the seven months ending January 31, 1944, there were 11 strikes in the pulp and paper manufacturing industry, with 4,784 workers walking out.

Like every problem that has its roots in human relations, the settlement of labor disputes is largely conditioned by the people who participate—their thoughts and feelings, their habits and prejudices are controlling. The U. S. Conciliation Service brings to these disputes the impartial advice of a friendly peacemaker. In this role the Commissioner can and does use force—the force of persuasion and seasoned judgment. With the vast bulk of employers and employees this is quite sufficient.

PAPER SKETCHES



IN LATER MEDIÆVAL TIMES, PAPER WAS WRAPPED ROUND THE SHANKS OF LEGS OR HAUNCHES OF HOT VENISON FOR CARVERS TO GRASP WHEN CUTTING PORTIONS.

MORE THAN 74,000 TONS OF WASTE-PAPER AND OBSOLETE RECORDS AND PRINTED MATTER WERE SALVAGED DURING THE LAST 6 MONTHS OF 1943 BY U.S. ARMED SERVICES AND GOVERNMENT AGENCIES. THE VALUE OF THIS SALVAGE AMOUNTED TO ALMOST $1,200,000.00.

AS EARLY AS 1814, TWO BRYAN DONKIN FOURDRINIERS, EXPORTED FROM ENGLAND TO RUSSIA, WERE SET UP IN THE IMPERIAL PAPER MILLS AT ST. PETERSBURG UNDER THE SUPERVISION OF ONE OF HENRY FOURDRINIER'S SONS.

ALTHOUGH ELECTED BISHOP OF THE AMERICAN MENNONITE CHURCH BY FOUR MINISTERS OF HAMBURG, GERMANY, WILLIAM RITTENHOUSE, AMERICA'S FIRST PAPERMAKER, DECLINED TO OFFICIATE BECAUSE NONE OF THE MINISTERS COULD CROSS THE OCEAN TO INSTALL HIM.

Tinkle

ALLIED

H. K. FERGUSON CO. MAKES MARKET SURVEY OF SOUTHERN INDUSTRY

Announcement of returns on a market survey has just been released by The H. K. Ferguson Company, industrial engineers and builders of Cleveland, New York, and Birmingham.

This survey was conducted by the Ferguson company's Birmingham manager, C. W. Roberts, and it is based on answers to a questionnaire circulated to several hundred leading Southern industrialists and scores of field contacts in every Southern state. Mr. Roberts states judging from the returns, a program of expansion, remodeling, and rehabilitation will start in the South immediately after present restrictions on building materials and equipment are lifted.

Tabulations of returns to the questionnaire indicate that the total volume of industrial building will be distributed as follows:

75 per cent for expansion of present facilities and for space in which to manufacture entirely new products.

15 per cent for reconversion of existing facilities to peacetime production.

10 per cent for "maintenance" construction and repairs.

According to Mr. Roberts, the relatively low percentage of money to be spent for reconversion work is attributed to the fact that few plants in the South were converted from their regular peacetime pursuits.

The following industrial classifications have indicated the greatest volume of future building:

Chemicals; Fertilizers; Railroads and public utilities; Pulp and paperboard manufacturing; Food processing and distribution outlets; Plastics; Newsprint, paper and paper containers; Refinery by-products; Glass industry; Textiles; Mining and ore reduction; Metal manufacturing.

◆

STARCH PLANT IN THE EVERGLADES TO EMPLOY DISABLED VETERANS

Supplementing the announcement which appeared in this section last month that the United States Sugar Corporation will build a $20,000,000 starch plant in the Everglades, comes news of a very interesting employment plan which is being formulated to be a part of that project.

The first announcement stated that 7,500 persons would be employed at this new plant. The company has been conducting a survey, so the second announcement reveals, to determine the various types of jobs that could be filled by handicapped soldiers in the sugar house, said to be the largest in this country, and in the new starch plant, now under construction.

Conferences on President Clarence R. Bitting's plan to aid veterans, particularly those suffering from partial disability, already have been held with Representative J. Hardin Peterson and Washington officials of the Veterans Administration and the War Manpower Commission. The company states it will make every effort to open an ever-increasing number of opportunities for disabled service men.

◆

▶▶▶ A NEW PLANT to employ about 100 persons is to be built by American Cyanamid and Chemical Corporation of New York, on a 40-acre site two miles south of Hamilton, Ohio, according to a recent announcement. The plant will be used for the manufacture of alums, caustic sodas, resins, synthetic resins and other products used in papermaking. It is understood that priorities for early construction are being sought.

◆

WATERPROOF BAG FOR INSTRUMENTS MADE BY U. S. RUBBER CO.

A waterproof instrument bag, employed by American invasion forces in the present Italian and Southern Pacific campaigns to transfer delicate electrical equipment, medical supplies and food from ship to shore, has enabled signal corps and medical men to set up telephonic and radio communications and fields hospitals upon landing, thereby saving thousands of lives as a direct result of scouting information and medical aid.

This bag, developed for the Signal Corps by United States Rubber Company, is the first piece of standard equipment to be used which employs natural air as a buoyancy factor in the transfer of heavy equipment in water.

◆

COCHRANE ACQUIRES RIGHTS TO ROTAMETERS

Cochrane Corporation of Philadelphia announces the acquisition of exclusive sales rights to the line of Rotameters manufactured and hitherto sold by Rotameters, Inc., of Jenkintown, Pennsylvania.

According to P. S. Lyon, president of the Cochrane Corporation, this is a logical addition to the Cochrane meter line, as Cochrane has manufactured and sold a recording area-type meter for the past seven years, and the addition of the Rotameter, or indicating type of area meter, rounds out the line.

No changes will be made in the personnel of the two companies.

◆

MONSANTO ACQUIRES LAUCKS GLUE INTERESTS

On March 13, Monsanto Chemical Company, St. Louis, Missouri, completed negotiations for the purchase of I. F. Laucks, Inc., Seattle, Washington, manufacturing chemists and leading producer of plywood glues.

Through this transaction, Monsanto will acquire the two Laucks plants in Seattle and other company interests at Vancouver, B. C.; Los Angeles; Portsmouth, Va.; Lockport, New York; Stanbridge, Que.; as well as interests which Laucks holds in companies in Australia and Sweden. The acquisition of the Laucks properties gives Monsanto a dominant position in the American plywood glue field.

◆

OFFSET IN POSTWAR

"What's Ahead for Offset" was the subject of an address by V. R. Mitchell, Harris-Seybold-Potter Company president, before the Racine, Wisconsin, Club of Printing House Craftsmen, February 24.

Mr. Mitchell cited the remarkable growth of offset lithography over the past twenty years and stressed the opportunity for offset development in the postwar era. The War, he said, had familiarized many commercial users of printing with the advantages of the process.

◆

ABACA NOW GROWN IN CENTRAL AMERICA

The Senate Appropriations Committee has received an estimate of prospective abaca production in Central America which is most encouraging.

Information published in the *Foreign Commerce Weekly* reveals that by 1945 it is estimated Central America will be supplying the United States with 15 to 20 per cent of the amount of abaca formerly imported from the Philippines. Abaca is the source of Manila hemp, essential for the manufacture of cordage for merchant and naval vessels, and before the War, virtually all of this country's requirements were imported from the Philippines.

A small experimental plantation, started in Panama in 1925 with the aid of the U. S. Department of Agriculture, furnished the root stock from

NEW CYANAMID MELAMINE RESIN PROVIDES IMPROVED, LASTING "WET STRENGTH" IN PAPER

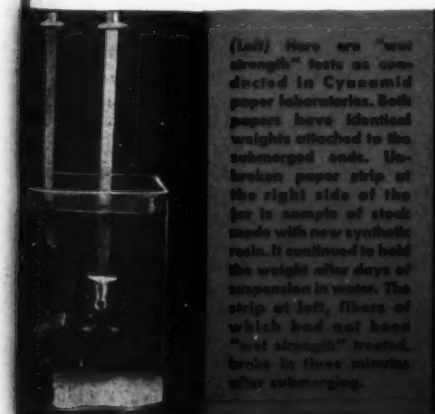
Cynamid's "secret" of providing "wet strength" to paper lies in the use of a special type of resin of exceptional efficiency which bonds fibers together so that they are highly resistant to separation when exposed to moisture. This new resin, developed in the Cyanamid laboratories, can be added directly to the fibers prior to the formation of the web. Thus without special equipment, manufacturers may turn out papers and packages that can replace and even improve upon the service qualities of critical materials.

This new resin, therefore, may be said to point the way to new usefulness for paper. Not satisfied, however, with the production of a material that would accomplish all this, research men in Cyanamid's paper chemical laboratories have by their diligent efforts been able to improve both the product and method of application.

Packaging papers, particularly where these are likely to be exposed to water such as in overseas shipments, have brought about an insistent demand for this new resin. Other fields of wartime use are for map, chart and blueprint papers . . . booklet stocks for field use . . . bandage and medical supplies . . . and other uses where resistance to inclement weather conditions is an important consideration. Here on the home front "wet strength" paper bags are replacing the traditional burlap for shipment to market of vegetables such as potatoes where vegetable moisture or wet weather might cause bursting of bags. It is likewise being used for tougher wrappings for meats and frozen foods . . . paper toweling and lens-wiping tissues.

Where strength (when wet) is the controlling factor governing basis weight of paper, the use of this resin will permit substantial reduction in basis weight with worthwhile savings in pulp.

For full details on the utilization of Cyanamid's new "wet strength" resin, see your Cyanamid representative or write to nearest Cyanamid office.



(Left) Here are "wet strength" tests as conducted in Cyanamid paper laboratories. Both papers have identical weights attached to the submerged ends. Unbroken paper strip at the right side of the jar is sample of stock made with new synthetic resin. It continued to hold the weight after days of suspension in water. The strip at left, fibers of which had not been "wet strength" treated, broke in three minutes after submerging.

(Left) Farmers were skeptical when potatoes were first sent to market in "wet strength" paper bags instead of the traditional burlap. But these bags have proven themselves to be strong and tough even when soaked through and through! As a result, not only potatoes, but other foods are being shipped this way.

(Right) Here, being subjected to water tests, are bags made of paper in which Cyanamid's "wet strength" resin is used.

American Cyanamid & Chemical Corporation

(A Unit of American Cyanamid Company)

30 ROCKEFELLER PLAZA · NEW YORK, N. Y.

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*Reg. U. S. Pat. Off.

which the Central American projects are being developed. At present, some 40,000 acres are being used for this experiment.

◆

AMER. BRAKE SHOE'S EXPERIMENTAL FOUNDRY READY FOR OPERATION

Opening of the American Brake Shoe Company's new experimental foundry at Mahwah, New Jersey, is announced by the company. The plant operates on a full-size scale rather than on the miniature basis customarily employed in pilot units, and is capable of handling castings having a gross weight of 2,000 lb.

Foundry equipment is completely modern and every known safety device has been included. A special dead front panel is installed in front of the electrical distribution switches, and motor generator room doors are protected by an electrical interlock.

The building is in two sections, and the foundry is housed in the 196 x 82 foot division. The upper floor of the other section is given over to offices, and the lower floor is used for a tool room, boiler room and storage space.

Experimental in nature, all foundry activities will be directed to furthering the War effort.

◆

A NEWLY ORGANIZED MANAGEMENT SERVICE

A new enterprise known as Service Engineering Company, with head offices in Summit, New Jersey, and an office at 52 Vanderbilt Avenue, New York, has been formed by Howard B. Bishop. The organization will provide management services, and, in some cases, finance the development of new products and processes in the chemical and chemical engineering field.

Mr. Bishop formerly was president of John C. Wiarda and Company of Brooklyn, New York, whose extensive import and jobbing business in miscellaneous chemicals has since been absorbed by American Cyanamid Corporation. The manufacture of hydrofluoric acid formerly conducted by the Wiarda Company was continued by Mr. Bishop in the name of Sterling Products Company, Easton, Pennsylvania; this business later being merged with the Pennsylvania Salt Manufacturing Company.

The new enterprise already has undertaken the development of two processes—one for the recovery of industrial wastes, controlled by Electrolytic Recovery Corporation, and the other a spray drying process controlled by Instant Drying Corporation.

◆

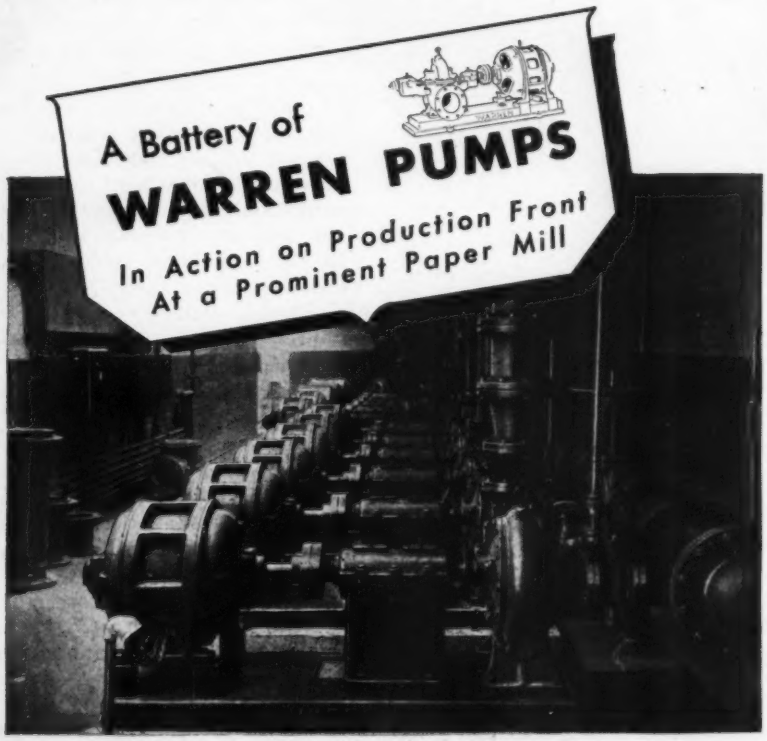
▶▶▶ WAR BONDS, CASH, and gold and silver pins were awarded to members of the Sandy Hill Club of the Sandy Hill Iron and Brass Works, Inc., Hudson Falls, New York, who submitted ideas for improving the quality or manufacturing processes of the company, at a club meeting held on March 30. During the evening, the club membership was increased from 60 to 90.

◆

▶▶▶ A CHANGE IN NAME has been announced by The Bedaux Company, Inc., with head offices in New York. This industrial engineering firm will hereafter be known as Albert Raymond and Associates, Inc. The company also maintains offices in Chicago, San Francisco, and Toronto, Canada, and it will continue to offer the same service as heretofore.

◆

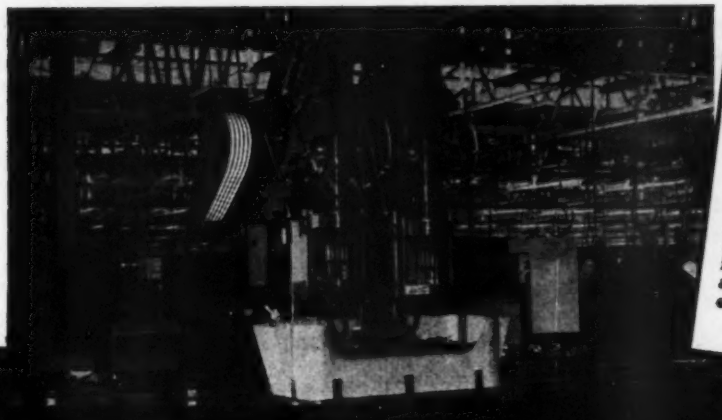
▶▶▶ FOR THE THIRD TIME, Buffalo Pumps, Inc., Buffalo, New York, has received a white star to be added to its Army-Navy "E" production award. A white star is awarded each six months for continued excellence.



And, like the men, women and equipment in all branches of the armed forces, these pumps are giving a good account of themselves. They stick with their jobs, through thick and thin, at remarkably low operating and maintenance costs. This goes for Warren Stock Pumps, Machine Chest Pumps, Liquor Pumps and Fresh Water Pumps. In other words, for low pumping costs on all Paper Mill services, specify:

WARREN PUMPS

WARREN STEAM PUMP COMPANY, INC.
WARREN, MASSACHUSETTS



✳Here, in one of the nation's leading Aircraft factories, belts on some machines were subjected to a severe oil condition. The Gates Field Engineer recommended Gates V-Belts of special synthetic rubber. Carefully kept records show that these belts are regularly wearing 3 times to 4 times as long as ANY belts of natural rubber ever used.

In This Leading Aircraft Factory . . . .

GATES ✳Synthetic Rubber V-Belts

Your Gates Field Engineer—listed in your telephone directory—will tell you which type of Gates V-Belt best meets your special needs.

Wear *3 TIMES* as *LONG* As Any *NATURAL RUBBER* V-Belts Ever Used!

For more than *6 years*, Gates Field Engineers have been recommending and installing Gates V-Belts of special synthetic rubber wherever a severe oil or heat condition exists.

These belts have now told their service story in aircraft factories, in steel mills, in ordnance plants, in machine parts factories and many other kinds of plants all over the United States. *Everywhere*, they have completely whipped the problem of severe oil conditions. They are wearing two and three and even *four times* as long as any belts of *natural rubber* ever used.

Isn't this a convincing illustration of what you stand to gain by calling the Gates Field Engineer whenever you have the slightest trouble with any drive problem?

You may not have an oil or heat problem — yet *other* service conditions may be such that a V-belt of some special construction can most profitably be used. For example, in your particular installation, Static-Safety V-belts may best fit your special need. Again, Rayon Cord V-belts or V-belts with tension members composed of flexible steel cables may prove to be the most efficient and economical.

In any case, the wisest move you can make is to phone the Gates Field Engineer. He is thoroughly competent to analyze any drive problem. He is completely informed on the nature and advantage of every type of belt. He will always recommend the practice that will be most efficient and economical for you.

GATES V-BELTS INCLUDE:—

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2. Static-Safety V-Belts
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ASSOCIATIONS

DR. KRESS TO SPEAK BEFORE PROFESSIONAL GROUP IN CHICAGO

Guest speaker at the May 1 dinner meeting of the Chicago Professional Paper Group, will be Dr. Otto Kress, technical director of the Institute of Paper Chemistry, Appleton, Wisconsin, whose subject will be "Fundamentals of Pulping."

Long affiliated with the pulp and paper industry, Dr. Kress has made many contributions to the literature of pulp and papermaking. At one time he was associated with the United States Forest Products Laboratory as chief of the pulp and paper section. He also served as technical director for Consolidated Water Power and Paper Company and as superintendent of manufacture for Thilmany Pulp and Paper Company.

Numerous patents bear his name, and in 1940 he was the recipient of the TAPPI medal.

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▸▸▸ THE NORTHWESTERN DIVISION of The American Pulp and Paper Mill Superintendents Association and the Lake States Section of TAPPI will hold a joint meeting April 22 at the Hotel Wausau, Wausau, Wisconsin. Early hotel reservations are recommended. A social evening at the Elks Club will precede the meeting the evening of the twenty-first.

◆

AREA MEETINGS HELD BY THE EMPIRE STATE SECTION OF TAPPI

During the war period, the Empire State Section of TAPPI is holding regional meetings in different sections of the State in order to expedite travel.

The Syracuse area group held a meeting March 9 at the Yates Hotel, Syracuse, New York, which was attended by about fifty members.

About fifty-five gathered on the same night at the Woodruff Hotel, Watertown, for a meeting of the Watertown area group.

The Glens Falls area group met March 10 at Glens Falls in a joint dinner meeting with members in that area of the American Pulp and Paper Mill Superintendents Association. Speaking before this meeitng, Vance P. Edwardes, national president of TAPPI, spoke of a plan which is being considered to stimulate ideas among the younger technical engineers in the paper industry. Under this proposed plan, regional and group prizes will be offered for the best technical papers submitted; the winners later to compete for a national prize. Mr. Edwardes also stated that the executive council of national TAPPI has decided in favor of more informal panel discussions on subjects of general interest to the meeting rather than the reading of formal papers at the national meetings.

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▸▸▸ THE PACIFIC SECTION of TAPPI will hold a meeting with the Pacific Coast Division of the American Pulp and Paper Mill Superintendents Association at the Multnomah Hotel, Portland, Oregon, June 2 and 3. Additional details will be available later.

◆

WASTEPAPER BLACK MARKET DISCUSSED

The National Association of Waste Material Dealers and affiliated groups recently held a war conference in New York City. A highlight of this conference was a joint session of the Waste Paper Institute and Associated Rag Industries, on March 15, at which time Louis A. Speiss, attorney for the Waste Paper Trade Committee and the Cotton Rag Council, addressed the gathering on what he termed "an appalling and disgraceful" situatiton which has been created by black market operators in the wastepaper industry.

Mr. Speiss made some very definite statements about this situation and stated his intentions in no uncertain terms. He asserted that the black market was shipping to mills engaged in making nonessential items, and he promised he would "bend every effort" to prosecute such cases.

James T. Flannery, chief of the Waste Materials Division of OPA's Paper and Products Branch, told the meeting that the OPA is conducting an intensive enforcement program designed to stamp out black market operations. He added that "operations in the black market are not at the high level which rumor has them." Mr. Flannery pointed out that approximately 8,000,000 tons of wastepaper, or 675,000 tons per month, must be collected to satisfy minimum requirements of the paper and paperboard industries. Although the collections of wastepaper represent a very encouraging increase (especially when compared with receipts of 526,000 tons in the preceding month, and of 468,000 tons for January of last year) collections are still lagging far behind the demand.

Mr. Flannery revealed that the OPA had felt for some time that "some type of control should be worked out to spread the supply." He said the agency "was willing to discuss a price increase," but would not aggravate the black market situation.

◆

CHICAGO PROF. PAPER GROUP HEARS ADDRESS ON "PAPER SALVAGE"

The fourth regular meeting of the Chicago Professional Paper Group was held during the evening of March 6th at Hotel Hamilton, Chicago, Illinois. The meeting proved to be a most enthusiastic one, and the attendance was good.

The guest speaker of the evening was James Flett, owner of the James Flett organization, a firm that specializes in problems incidental to the sale of industrial salvage. His subject was Paper Salvage, and he was most dramatic in handling it. Just like the magician pulling the rabbit from the hat, Mr. Flett had a number of small bags filled with different kinds of paper scrap, and at the proper time in his remarks, he opened these bags one at a time and explained just what the individual sample was. He gave its name, told where it was obtained, mentioned its use or uses and also its selling price. He also demonstrated the bleaching of old newsprint utilizing the Snyder-MacLaren process.

Previous to this feature address by Mr. Flett, K. H. Hobby, corresponding secretary, Chicago Technical Societies Council, spoke briefly on the work of the Council. Mr. Alley, president of the Chicago Professional Paper Group, in introducing Mr. Hobby, mentioned that the Chicago Professional Paper Group is now affiliated with the Chicago Technical Societies Council and is to participate in the second War Production and Related Problems Conference which is being sponsored by the Council and will be held at the Stevens Hotel, Chicago, March 30, 1944. Two war packaging panel discussions have been arranged for presentation at this conference by the Chicago Professional Paper Group. One of these panels is entitled "Forest Products Laboratory Activities in Connection with Wartime Packaging"; the other "How to Package War Goods to Pass Inspection."

An added feature of the program was the showing of *Desert Victory*, the famous British war film depicting

the British 8th Army's victory at El Alamein and its advance to Tripoli. The film was shown through the courtesy of the Chicago office of British Information Services.

◆

▸▸▸ SULPHITE PULP will be the topic of the joint meeting of Connecticut Valley Division of The American Pulp and Paper Mill Superintendents Association and the New England Section of TAPPI at the Hotel Kimball, Springfield, Massachusetts, April 21. Important speakers on the program are S. G. Blankinship, national president of the Superintendents Association, and Vance P. Edwardes, national president of TAPPI. Dinner at 6:30 will precede the meeting.

◆

CONVENTIONS AND COMING EVENTS

April 18-20—All-Ohio Safety Congress and Exhibit at the Deshler-Wallick Hotel, Columbus.

April 21—Joint meeting of Connecticut Valley Div. of the American Pulp and Paper Mill Superintendents Association and the New England Section of TAPPI at Hotel Kimball, Springfield, Mass.

April 22—Joint meeting of Northwestern Division of the American Pulp and Paper Mill Superintendents Association and the Lake States Section of TAPPI at Hotel Wausau, Wausau, Wis.

May 2-4—22nd Annual Midwest Safety Conference, at the Hotel Sherman, Chicago.

May 24-26—Annual meeting of the American Pulp and Paper Mill Superintendents Association, at the Edgewater Beach Hotel, Chicago.

June 2-3—Joint meeting of Pacific Coast Division of the American Pulp and Paper Mill Superintendents Association and the Pacific Section of TAPPI at the Multnomah Hotel, Portland, Ore.

October 3-5—33rd National Safety Congress and Exposition at the Sherman, Morrison and La Salle Hotels, Chicago.

November 15-19—National Chemical Exposition at the Coliseum, Chicago.

STATED MEETINGS

Technical Associations of the Pulp and Paper Industry

Delaware Valley Section—First Friday of each month at the Engineers' Club, Philadelphia, Pa.

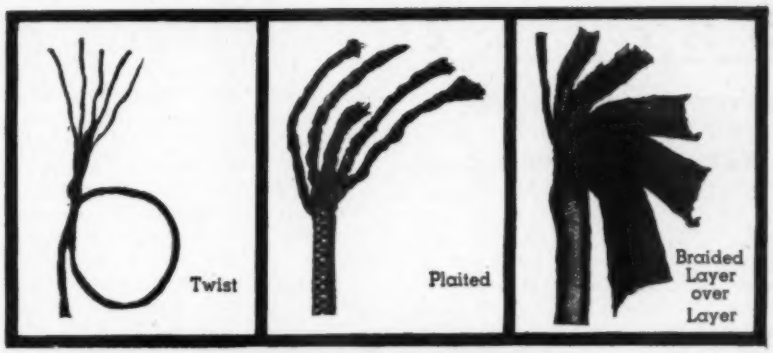
Kalamazoo Valley Section—First Thursday of each month, including June, at 6:30 P. M. at the Columbia Hotel, Kalamazoo, Mich.

Lake States Section—Second Tuesday of each month at the Conway Hotel, Appleton, Wis.

New England Section—Third Friday of each month at the Roger Smith Hotel, Holyoke, Mass.

Chicago Professional Paper Group

First Monday of each month except July and August, at Chicago.



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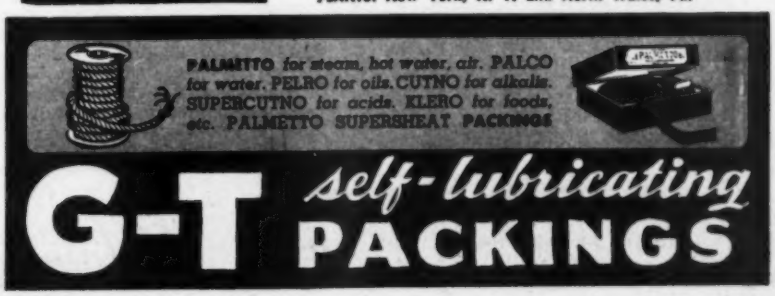
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SAFETY

SAFETY COURSE NOW OFFERED BY U. S. DEPARTMENT OF LABOR

One million fewer work accidents in the next twelve months is the goal set by Secretary of Labor Frances Perkins for attainment by American labor and management, according to Verne A. Zimmer, director of labor standards, U. S. Department of Labor.

In speaking of the importance of such a program, Mr. Zimmer made the following comments: It is an ambitious goal because it represents a 40 per cent reduction from the total of 2,500,000 industrial accidents which occurred in 1943, and its attainment will require the active aid and interest of every manager, worker and labor union. It is a major home front task.

Last year, industrial accidents took the lives of 18,400 workers, totally and permanently disabled 1,700 more, permanently crippled 108,000 others, and temporarily laid up 2,225,000 workers for an average of 15 days apiece. This means that every day throughout 1943, 180,000 workers failed to report for work because of injuries. It means that 20,000 workers are permanently removed from our industrial army, and 108,000 others are unable to perform their jobs as efficiently during 1944 as they did in 1943. Job injuries waste precious productive time, destroy irreplaceable manpower, and rob the nation of critical skills.

Can these accidents be stopped? They most certainly can, Mr. Zimmer continued. Nine out of every ten industrial accidents are definiely preventable. In the past three years a task force of 600 top flight safety engineers, recruited by the U. S. Department of Labor on a voluntary basis, brought safety service directly into 25,000 war contract plants. Seventy-five per cent of the firms accepting this service have materially reduced their accident frequency.

Groups of union officials, stewards and business agents are enrolling in safety training courses sponsored by the U. S. Department of Labor, in collaboration with the U. S. Office of Education. These are the same practical safety courses in which more than 50,000 plant foremen and leadmen already have received realistic instruction on how to make a plant accident-free.

Detailed information concerning the special training course for labor groups can be obtained by writing to the Division of Labor Standards, U. S. Department of Labor.

SAFETY SCORES

▶▶▶ IN THE ANNUAL Paper Industry Safety Contest which began July 1, 1943, reports received for February show nine mills maintaining a perfect record. These mills are:

Division I—Pulp and Paper Mills

Groups A and B—(None)

Group C—

Strathmore Paper Co. (Woronoco Mills), West Springfield, Mass.

Group D—

Marathon Paper Mills Co., Rothschild, Wis.

Spaulding Fibre Co., Inc., North Rochester, N. H.

International Paper Co., Riley, Maine.

Division II—Paper and Board Remanufacturing

Thilmany Pulp & Paper Co. (Bag Mill), Kaukauna, Wis.

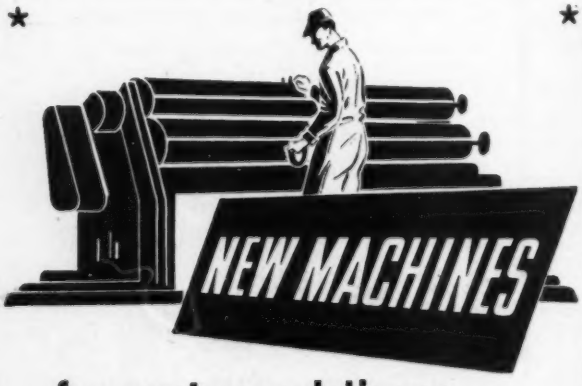
Kimberly-Clark Corp. (Atlas Mill), Appleton, Wis.

Bird & Son, Inc., Shreveport, La.

South West Box Co., Sand Springs, Okla.

Bay West Paper Co., Green Bay, Wis.

The paper industry safety contest is conducted among member mills of the Paper and Pulp Section of the National Safety Council, and runs for twelve months. The present contest covers the period July 1, 1943 to June 30, 1944.



for post-war delivery . . .

Just to remind you that we will again be prepared to give you new and improved equipment for your post-war paper converting problems.

Both your plant and our plant are now interested in one objective — beating the Axis.

After the war you will need, and we will build, equipment to meet your post-war needs.

It might be well to do a little thinking and planning about these requirements right now!

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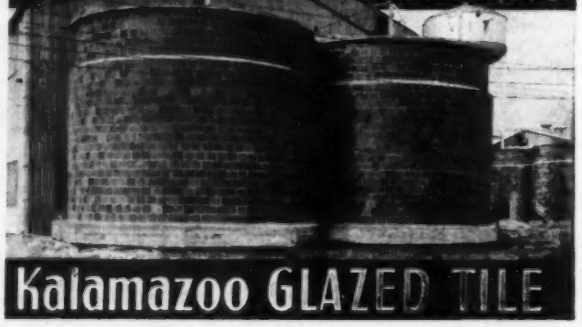

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NAMES *in the* NEWS

Personals

GEORGE M. HUNT ASST. DIRECTOR AT U. S. FOREST PRODS. LAB.

George M. Hunt, who for many years has been chief of the Division of Wood Preservation at the United States Forest Products Laboratory, is appointed an assistant director of the laboratory, Director Carlile F. Winslow announces.

Mr. Hunt has been on the laboratory staff for more than thirty years as a chemist, during which time he has specialized in the field of wood preservation. Since 1920 he has directed the research of the laboratory's Division of Wood Preservation, which covers glues, plywood manufacture, wood finishing, and fireproofing, in addition to wood preservatives and preservative treatments.

In his new capacity, Mr. Hunt will serve as Director Winslow's representative in planning, integrating and coordinating the laboratory's research program and in developing postwar needs and plans, Mr. Winslow said. T. R. Truax, who has been Mr. Hunt's associate while the latter was chief of the Division of Wood Preservation, now is directing that Division.

Since the entry of the United States into the present War, extensive research programs for the Army, Navy, War Production Board and other war agencies have been conducted under Mr. Hunt's direction. Plywood and glues for Army and Navy wood aircraft are used according to specifications based on research under these programs, and wood aircraft construction, inspection and repair methods have been materially influenced thereby.

Research under his supervision also has covered the testing of wood and glue preservatives, fire-retardant paints, and laminated timbers for heavy construction and ships. The scope of this research ranges from studies of treatments that protect wood from marine borers infesting salt water, to the testing of modern synthetic-resin glues to ascertain their adaptability in aircraft, ships and prefabricated housing.

During the summer of 1926, Mr. Hunt visited a dozen European countries to study advances made in wood utilization, inspecting developments in Great Britain, Germany, France, the Low Countries, Sweden, and Central Europe. He is joint author with Dr. George A. Garratt of the School of Forestry at Yale University, of a standard textbook on "Wood Preservation." In 1933, at the request of the Alaska Railroad, he made an investigation of the feasibility of constructing a wood preserving plant in Alaska to treat ties and timbers for that railroad. He has also served on the Committee on Marine Piling Investigations of the National Research Council and the Marine Piling Committee of the American Wood Preservers' Association.

A native of Salem, Oregon, Mr. Hunt is a graduate of the University of California at Berkeley. Shortly after his graduation he joined the Forest Service at San Francisco, California, in 1911 as a chemist. He was transferred to Seattle in 1912 and to the laboratory in 1913, and has remained there ever since.

◆

POTRATZ NOW HEADS HOIST SALES DIVISION HARNISCHFEGER CORP.

E. W. Potratz, of Harnischfeger Corporation, Milwaukee, Wisconsin, is now manager of the Hoist Sales Division. His charges include the four classes of P&H hoists, Handi-Lift, Zip-Lift, Hevi-Lift, and Trav-Lift cranes.

Mr. Potratz' association with the company has been marked by sound and rapid advancement, and coincides with many important product developments in the P&H line. Since 1942, with the protracted illness of George Drake, he was acting sales manager. He joined the organization's Hoist Division as an estimator in 1935, and in 1939 was named assistant sales manager.

Prior to joining Harnischfeger, Mr. Potratz was employed in product engineering and development with several leading industrials in the middle west.

E. W. Potratz

◆

WITCO ANNOUNCES THE APPOINTMENT OF TWO NEW VICE PRESIDENTS

Two new vice presidents have been appointed recently, according to announcement by Robert I. Wishnick, president of Witco Chemical Company.

C. A. Hemingway, who has been associated with the company since 1922, has been made a vice president. He will continue in charge of the company's Cleveland office, where he has supervised the sale of Witco products.

The other newly-elected vice president is C. J. Minning, who will direct the company's sales with headquarters at the Akron office.

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▶▶▶ At a recent board meeting of the Downingtown Manufacturing Company, Downingtown, Pennsylvania, *Ellis Y. Brown, Jr.*, was re-elected president and treasurer. *Jacob Edge, Edward T. Street,* and *Enright A. Ellis* were re-elected vice presidents in charge of sales, engineering, and manufacturing, respectively. *Ellis Y. Brown III* was made secretary of the company, which office was held by his father prior to his election as president in October, 1943.

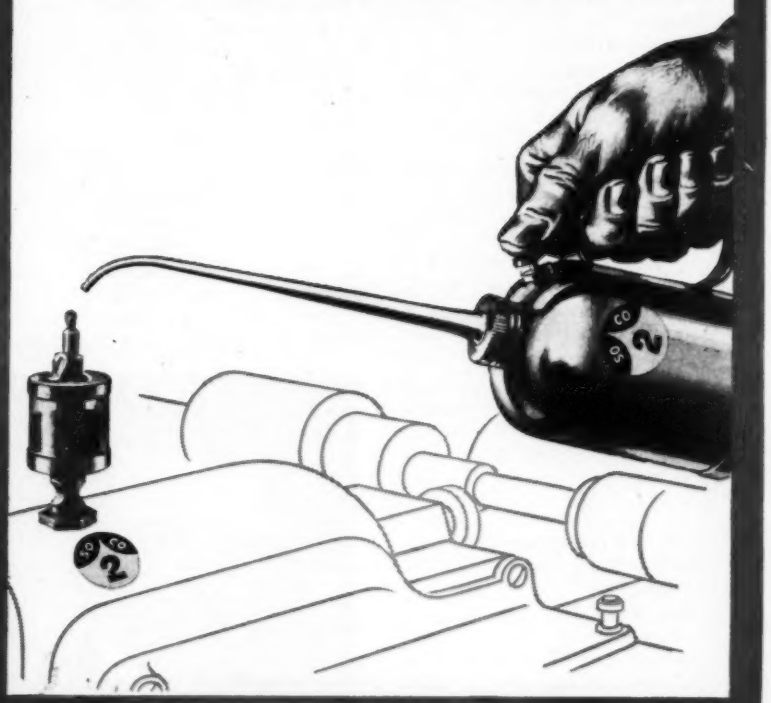
◆

VASCO E. NUNEZ MADE PRESIDENT OF NASHUA GUMMED & COATED CO.

At the recent annual meeting of the Nashua Gummed and Coated Paper Company, Nashua, New Hampshire, Vasco E. Nunez, vice president and general manager of the company, was elected president to succeed the late Winthrop L. Carter.

Other elections at the meeting were: Robert A. Brown, vice president; Eliot A. Carter, vice president and assistant treasurer; Oscar L. Tracy, treasurer; Edward C. Smith, secretary; and Hubert L. Carter, clerk. Com-

It's "Blunder-proof"



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No one knows better than the man in charge of your lubrication, the *need* for this simple, "blunder-proof" coded system.

Each separate lubricant used in your plant is given its own code number. *Every* lubrication point requiring that particular lubricant, and *every* container or device handling the servicing lubricant is clearly marked with a bright decalcomania transfer bearing its code number.

When this simple code system is followed, no point of lubrication can receive the *wrong* lubricant—points requiring lubrication are easier to see—less reliance must be placed on the memory of your oilers.

Standard Coded Lubrication Service is carefully planned to simplify, not complicate your lubrication problems. It not only makes easier and more effective the work of your oiler crews—makes inexperienced oilers almost as reliable as old hands—but also, it immediately clarifies and simplifies the efforts of the *men in charge* of this important part of your operations.

This Coded Service is at *your* service—without cost—if your plant is located in the Middle West.

Considerable advance demand was created when this plan was first submitted to representative industrial groups. Materials are being produced as fast as wartime conditions permit. We suggest you get your request on file at your nearest Standard Oil office.

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this simple code system may be fitted to your lubrication plan:

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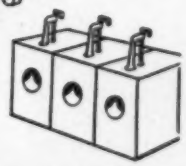
and every barrel, drum, or storage tank in your oil house.



Machine Record Cards: Where desired, a supply of machine record cards (4"x6") is provided.

Lubrication Chart: For control purposes, a card is provided to list, by brand name and code numbers, all lubricants used in the plant. This card is used by stock clerk or stockkeeper to enable him to requisition products by brand name, and to mark barrels with the correct code numbered decal.

This Booklet gives full details of how Standard Coded Lubrication Service can go to work in your plant. Ask your Standard Oil Man for a copy. Talk it over with him and the men in charge of your lubrication. See how this plan fills a gap in your lubrication program. Call the nearest Standard Oil Company (Indiana) office, or write 910 S. Michigan Avenue, Chicago 5, Illinois. In Nebraska, write Standard Oil Company of Nebraska at Omaha 2.

STANDARD OIL COMPANY (INDIANA) STANDARD SERVICE

★ LUBRICATION ENGINEERING

prising the board of directors are the officers and Trevor R. Gautier, Walter F. Evans, and Donald Ramsay.

Mr. Nunez also was made president of the Nashua Package Sealing Co.

◆

DR. MEILER RESIGNS FROM MARATHON TO GO WITH DIAMOND ALKALI

Former director of the Plastic Division of the Marathon Paper Mills at Rothschild, Wisconsin, Dr. John Meiler now has joined the research department of Diamond Alkali Company, Pittsburgh, Pennsylvania.

Dr. Meiler is a graduate of the University of Chicago, with B.S. and Ph.D. degrees in physical chemistry.

Dr. John Meiler

At one time he taught this subject at the University of Nebraska, and later was associated with the A. O. Smith Corporation of Milwaukee, doing research on iron, steel and plastics.

He is a member of the American Chemical Society, American Physical Society, Electrochemical Society, Society of Plastic Engineers and the Society of Plastics Institute.

◆

MOSKOVICS LEAVES GOVT. SERVICE—NOW WITH A. O. SMITH CORP.

On March 1, Frederick E. Moskovics resigned from government service where he has served as technical advisor in several divisions of the service since 1941. Mr. Moskovics is now associated with A. O. Smith Corporation, Milwaukee, Wisconsin, as industrial consultant.

Prior to his connection with the Government, Mr. Moskovics had a long and successful career in the automobile industry, both technical and administrative.

DR. V. N. KRIVOBOK NOW CONNECTED WITH INTERNATIONAL NICKEL

A recognized authority on stainless steel, and until recently chief metallurgist for Lockheed Aircraft Corporation, Burbank, California, Dr. V. N. Krivobok now is associated with the Development and Research Division of The International Nickel Company of New York.

For many years professor of metallurgy at the Carnegie Institute of Technology, Dr. Krivobok also served as associate director of research for the Allegheny Ludlum Steel Corporation (Breckenridge, Pennsylvania). He is a graduate of Harvard Engineering School and the author of many papers on stainless steels and other steel alloys.

In his new capacity, Dr. Krivobok will assist in developing markets for stainless steels and alloys, and in their expansion for postwar products.

◆

▶▶▶ New vice presidents of the Sullivan Machinery Company, Michigan City, Indiana, are: *O. J. Neslage, J. A. Drain,* and *L. J. Noel.* In making the announcement, F. W. Copeland, company president, stated that Mr. Noel also had been elected treasurer of the company.

◆

B. R. NEUMANN JOINS NAT'L FOREMEN'S INST.

Until recently senior economist with the Planning Divison of the WPB, Bruno R. Neumann has joined the National Foremen's Institute, Inc., Deep River,, Connecticut, as labor economist and editorial director. He will make his headquarters at the company's editorial office in New York, and will head up the Institute's research and consulting service on labor economics and labor relations.

Prior to his service with the WPB, Mr. Neumann was a member of the economic research staff of the National Association of Manufacturers. His experience abroad includes intimate familiarity with economic and labor relations problems in Great Britain and other European countries, as well as in the United States.

◆

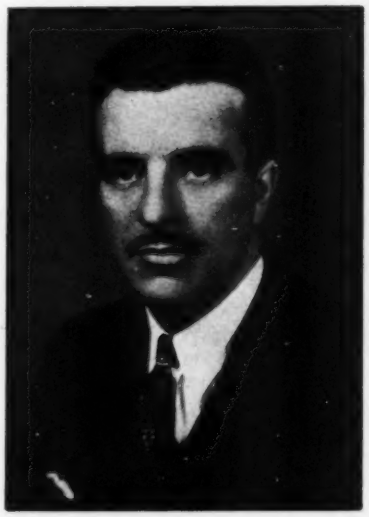
DR. ROWLEY MADE CHAIRMAN OF N. B. DEVELOPMENT BOARD

The appointment of Dr. Harry J. Rowley as chairman of the newly created New Brunswick Resources Development Board, is announced by Premier J. B. McNaur of New Brunswick, Canada. Dr. Rowley is chemical engineer of Allied War Supplies, Montreal, and formerly was with Anglo-Canadian Pulp and Paper Mills, Quebec.

The board personnel also includes Dr. John S. Bates, Montreal manager for Price and Pierce, Ltd., who holds a doctorate of philosophy from Columbia University and an honorary degree of doctor of science from Acadia University.

◆

▶▶▶ Former associate forest economist with the Lake States experimental station at University Farm, *George B. Amidon* now is with the Minnesota and Ontario Paper Company, Minneapolis, Minnesota, as head of the newly created forest management department. A graduate of the Univer-



George B. Amidon

sity of Minnesota Forestry College, Mr. Amidon spent five years with the Minnesota State Division of Forestry, and later served with the United States Forest Service.

◆

▶▶▶ *James G. Whiting,* second class petty officer in the U. S. Naval Reserve, has been on duty for several months on a naval submarine net-tender in the Southwest Pacific. President of Collins Manufacturing Company, Wilbraham, Massachusetts, he is on leave-of-absence from company duties.

◆

EDW. CREAGH IN NEW POSITION AT AMERICAN CHAIN AND CABLE CO.

Advertising and sales promotion manager for American Chain and Cable Company, Inc., of Bridgeport, Connecticut, and affiliated companies, is the new position accorded Edward V. Creagh.

Check These Features when you order

STAINLESS STEEL welding fittings

1 SMOOTH INTERIOR WALLS
The longitudinal weld is ground smooth. Interior walls retain the smooth surface of the stainless strip from which they are made and are free from tool marks, scoring, and surface imperfections.

2 CORROSION RESISTANCE
After complete fabrication, elbows are annealed, sandblasted and passivated to place the metal in the best physical state for corrosion resistance.

3 ANALYSIS CERTIFICATION
The approximate analysis is shown by the numerals stamped below the trade mark, indicating the Type No. of the alloy in the fitting. The exact analysis and other specific data such as heat treatment, physical properties, etc., are indicated by the reference number stamped above the trade mark. This information is available from our files.

4 PRESSURE TESTED
Every fitting receives a hydrostatic test after fabrication is completed.

5 ENDS BEVELED
The ends are accurately machine cut and beveled to 45° with approximately 1/32" straight face.

6 1½ R
The radius of each 90° and 45° stainless elbow is 1½ times nominal pipe diameter. This permits the fabrication of compact piping without excessive restriction of flow.

WHEN a stainless steel welding fitting possesses all of the features listed above, you are assured of complete satisfaction in field erection, as well as in service.

The Stainless Steel Division of Pittsburgh Piping & Equipment Company has spent many years in the development of welding fittings for every stainless steel requirement. Tees, 45° and 90° Elbows, Reducers, Caps, and Lap Joint Nipples of stainless types Nos. 304, 316, 347, and other alloys, are made in sizes ranging from 1" to 24" inclusive.

Welded Stainless Steel Tubing is manufactured in sizes ranging from 4" up, with wall thicknesses ranging from No. 12 gauge to ½", in the alloys designated above.

For further information, send for bulletins S-306 and S-307 or contact our nearest representative.

STAINLESS STEEL DIVISION

Pittsburgh Piping AND EQUIPMENT COMPANY

Let's All Back The Attack
Buy More War Bonds

10 Forty-Third Street · Pittsburgh · Penna.

Woolworth Building, New York · Occidental Building, Indianapolis · Peoples Gas Building, Chicago · Book Tower, Detroit
Public Square Building, Cleveland · · 10 High Street, Boston · · 525 Market Street, San Francisco

Mr. Creagh, who joined the organization in 1916, was placed in charge of sales promotion activities in 1936, and his new duties also will include newspaper, magazine, business publications, and other forms of advertising. One of the organizers, and first president, of the Western New England Chapter of National Industrial Advertisers Association, Mr. Creagh now is serving as vice president of the national organization.

◆

NEW K-C APPOINTMENTS

General sales manager of Kimberly-Clark Corporation, Neenah, Wisconsin, is the new position now held by C. F. Jenkins.

Other promotions in the sales organization are announced by the company: L. Stedman, sales manager of the Paper Division; R. B. Sawtell, sales manager of creped wadding products; W. W. Cross, sales manager of War Products Division sales; A. G. Sharp, manager of sales engineering; G. E. O'Malley, district manager of paper sales in the east, with headquarters in New York.

◆

▶▶▶ The appointment of *William D. Turnbull* as manager of Westinghouse Electric and Manufacturing Company's agency and specialties department (East Pittsburgh) is announced by company officials. Mr. Turnbull's appointment marks his return to Westinghouse after a four-year absence. During the interim he was associated with the Pomona Pump Company of California as vice president and sales manager.

◆

TWO APPOINTMENTS AT INDUSTRIAL RAYON CO.

The appointment of Alden H. Burkholder as assistant research manager, and Emil Kline as chemical control manager, is announced by Hayden B. Kline, vice president of Industrial Rayon Corporation, Cleveland, Ohio.

Mr. Burkholder has been with the company since 1929, and has contributed materially to inventions and patents. Dr. Kline joined Industrial in 1941 after 16 years' experience in the field of rayon cellulose technology. Both are members of the American Chemical Society.

◆

▶▶▶ Known in the industry through his work as a specialist in fire protection engineering, *Harold Joe Davis* has been discharged from the Armed Service. He was wounded while serving with forces in Alaska, but is now recovered and ready to resume his work. He is located in Tulsa, Oklahoma.

▶▶▶ The resignation of *Albert Ernest* as manager of the Woodlands Division of the Savannah, Georgia, plant of the Union Bag and Paper Corporation is announced by the company. He will be succeeded by *Jesse J. Armstrong*, assistant manager for the past three years. It is understood that Mr. Ernest now will associate with J. H. Allen, forest industrialist of Pensacola, Florida, in the development of pulp and paper production.

Necrology

J. ANDERSEN

President and director of The Pulp and Paper Trading Company and J. Andersen and Company, both of New York, Johannes Andersen passed away in a New York hospital on March 27 at the age of 76.

Born in Norway, Mr. Andersen migrated to Canada in 1882, and a year later went to New York, where he was employed for a time in the Norwegian-Swedish Consulate. In 1891 he became associated with Frederick Bertuch and Company, a pulp and paper company. He purchased this company three years later, upon becoming president of The Pulp and Paper Trading Company, and founded J. Andersen and Company.

Mr. Andersen was a past vice president of the Norwegian-American Chamber of Commerce. He is survived by two sons, one a captain in the U. S. Army.

◆

▶▶▶ Long connected with the paper industry as representative of kraft paper manufacturers, *George M. Wetmore* was killed while cleaning an automatic pistol at his cabin on the grounds of the Camp Fire Club of America. The owner of an exceptionally fine collection of fire arms, he had cleaned several of his guns when the automatic was discharged into his chest. Until recently, Mr. Wetmore was sales manager for the Claremont Paper Company, Inc., of Claremont, New Hampshire.

◆

ANDREW L. KREUTZER

Attorney, industrialist and one of the founders of the kraft paper industry in the Wisconsin River valley, Andrew L. Kreutzer passed away in Wausau on March 27 at the home of his daughter Mrs. P. M. Wilson, with whom he had lived in recent years. He was 81 years old.

In 1910 Mr. Kreutzer helped to organize the Wausau Sulphate Fiber Company (now the Mosinee Paper Mills Company, with offices and plant in Mosinee), and has since served continuously as company treasurer. Mr. Kreutzer also was active in the organization of the Tomahawk Kraft Paper Company about 1921, and has since served as president of that organization. Both plants are engaged in the manufacture of kraft paper, in which field the Mosinee firm was a pioneer in Wisconsin.

Surviving are two children, Mrs. P. W. Wilson, and Samuel Knox Kreutzer (the latter of Evanston, Illinois).

◆

▶▶▶ *Walter H. Bovee*, former pulp mill superintendent for Union Bag and Paper Corporation, Hudson Falls, New York, passed away in Schenectady, New York, on March 27. He is survived by his widow and a son.

◆

FRED S. DORAN

A vice president of Joseph T. Ryerson and Son, Inc., Fred S. Doran passed away in Chicago on March 21. He was 56 years old.

Mr. Doran entered the employ of the company thirty-nine years ago. He became manager of the Cleveland plant in 1927, returning to Chicago in 1942 as vice president in charge of purchases for all ten Ryerson plants.

◆

▶▶▶ *Andrew J. Reed*, retired papermaker, passed away at his home in Dalton, Massachusetts, on March 25. He was 91 years of age. Prior to his retirement eleven years ago, Mr. Reed had worked for the Byron Weston Company, and was foreman of finishing when he retired.

◆

W. W. HIGHBERGER

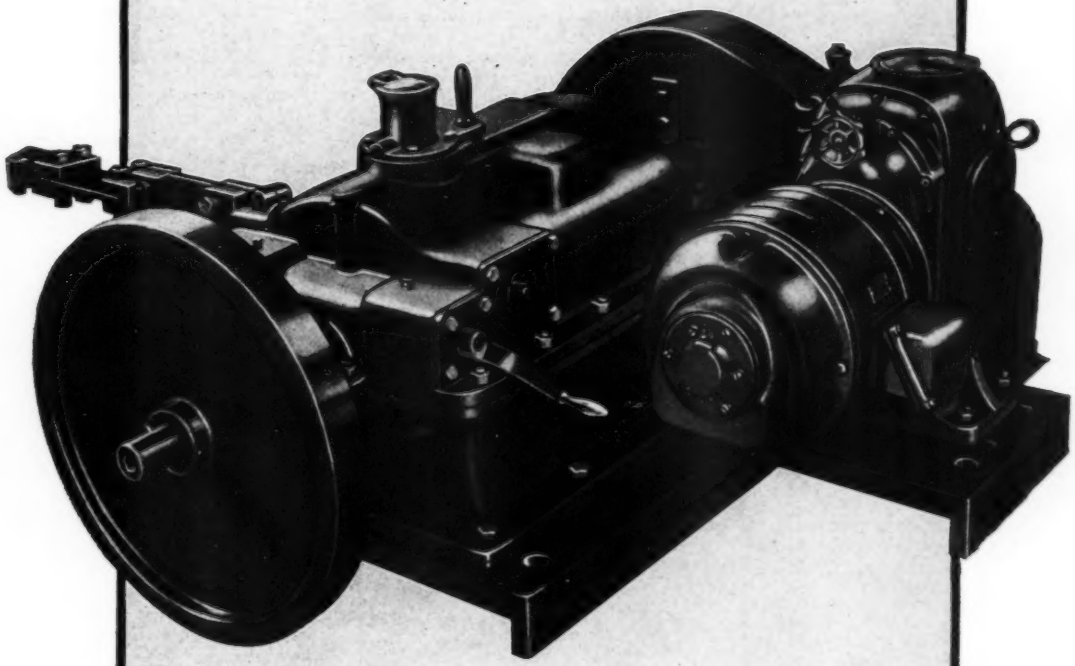
Reported missing in the European theater a year ago, and now listed as lost in action, Second Lieutenant W. W. Highberger of the Chemical Warfare Service, U. S. Army, has been posthumously awarded the Order of the Purple Heart "for military merit and for wounds received in action." The decoration has been presented to his widow, Dorothy F. Highberger.

Lieutenant Highberger, a graduate of Layfayette College, class of 1927, joined the Mathieson Alkali Works, New York, in 1932. Following many years of valuable experience with them in the chemical field, he received his commission in 1942, was given special training in chemical warfare at the Edgewood (Md.) Arsenal, and served overseas in an administrative capacity.

Dependability . .

THE SIMPLEX SHAKE

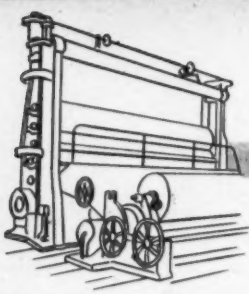
. . Easy Installation
. . Positive Action
. . Adjustment of Speed and Stroke While Running



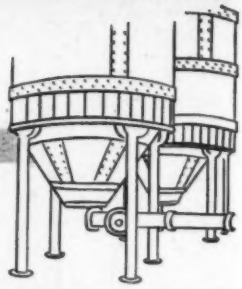
The Bagley and Sewall Company

Builders of Paper Making Machinery

WATERTOWN, NEW YORK



Practical SHORTS



Readers are invited to submit short, practical articles for this department. The items should be original and should relate to ways and means of handling production and maintenance jobs. Where possible, articles should be illustrated. Rough sketches only are required. Payment will be made for acceptable items upon publication.

Differences Between Heartwood and Sapwood

Sapwood is the outer light-colored portion of a tree trunk through which the water passes from the roots to the leaves, and in which excess food is often stored. Heartwood is the central core of the trunk. In most woods the heartwood can be distinguished from the sapwood by its darker color. But in hemlock, aspen, cottonwood, beech with white heartwood, all spruces except Sitka spruce, basswood, holly, hackberry, tupelo gum, and the true firs (not Douglas fir), there is very little difference in the color of the heartwood and the sapwood.

As new sapwood is formed under the bark, the inner sapwood changes to heartwood. In the wood undergoing this change the living cells die; the pores in some woods become plugged with frothlike growths, known as "tyloses;" and the cell walls, and in some species the cell cavities, become infiltrated with various substances, some of which darken the wood. In certain species these infiltrations are known to add appreciably to the weight of the wood, for example, in ebony and rosewood, in which the pores become filled with more or less soluble deposits; and in redwood and black locust, in which the water soluble infiltrations may add 5 to 15 per cent to the dry weight.

In over 500,000 tests, which have been made by the Forest Products Laboratory, Madison, Wisconsin, on the various species of wood grown in the United States, no effect upon the mechanical properties of the wood due to its change from sapwood into heartwood has been found in most species. The heartwood of oak, pine, and Douglas fir, for example, is not intrinsically stronger than the sapwood, as has often been supposed to be the case; nor is the sapwood of hickory and ash intrinsically stronger than the heartwood, as is sometimes claimed in connection with handle stock. However, in some species, in which the heartwood is high in infiltrations, or "extractives," such as redwood, western red cedar, and black locust, the heartwood has been found to be considerably stronger in certain strength properties than the sapwood. In these species, however, the amount of sapwood in virgin-growth timber is relatively small.

Heartwood as a rule, is more durable than sapwood in damp locations and less subject to attack by certain insects and by stain—and mold-producing fungi. It usually is colored and therefore considered more ornamental than the white sapwood, except in a few cases; in yellow pine interior finish and maple flooring, for example, the white sapwood is preferred. Heartwood is less permeable to liquid and therefore more suitable for tight cooperage, tanks, and conduits. The heartwood of some species contains more valuable extractable materials, such as tannin and dyes, than does the sapwood.

Sapwood, as a rule, takes preservative treatment better than heartwood. In general, sapwood when green contains considerably more moisture than does heartwood, the difference being more pronounced in the softwoods. With few exceptions sapwood seasons faster per unit of time than does heartwood, but because of its higher percentage of moisture when green, it dries in about the same time. The difference in density between heartwood and sapwood of American woods is usually not great but since sapwood contains on an average more moisture than does the heartwood, it follows that when green the weight per cubic foot of the sapwood averages higher than that of the heartwood. Because sapwood is the outer portion of the tree, it contains in large trees fewer common defects, such as knots, shakes, and pitch streaks. In resinous species, the sapwood usually contains less resin than the heartwood. Sapwood is more free from odor and taste.—*Technical Note No. 189,* FOREST PRODUCTS LABORATORY.

How to Obtain Greater Efficiency and Make Circular Knives Last Longer

Failure	Cause	Correction
Rim cracks	Dull cutting edge	Keep edge sharp
	Bevel too long or too short	Study the job. Some materials require a shorter bevel than others. The kind, thickness and size of material to be cut must be considered in determining the size of bevel used.
	Incorrect feed for material being cut	Knife will take feed better when edge is keen and sharp. Where possible have sharpening attachment on the under side of machine to keep edge sharp while in operation.
	Incorrectly beveled	For most jobs a straight bevel will be found most satisfactory. When cutting materials which can be fed to knife quickly, a bevel having a slight concave will perform satisfactorily. However, avoid a weak bevel caused by too much concave. A convex bevel in most cases results in knife heating at the rim.
Out of round	Incorrect sharpening methods	Joint knife—keep it round by machine sharpening. Or by keeping edge in constant contact with some sharpening agency.
	Dull cutting edge	Keep edge of knife sharp. We recommend, where possible, the installation of a sharpening attachment on machines which will sharpen knife while it is cutting. This will also keep rim concentric with the center hole.

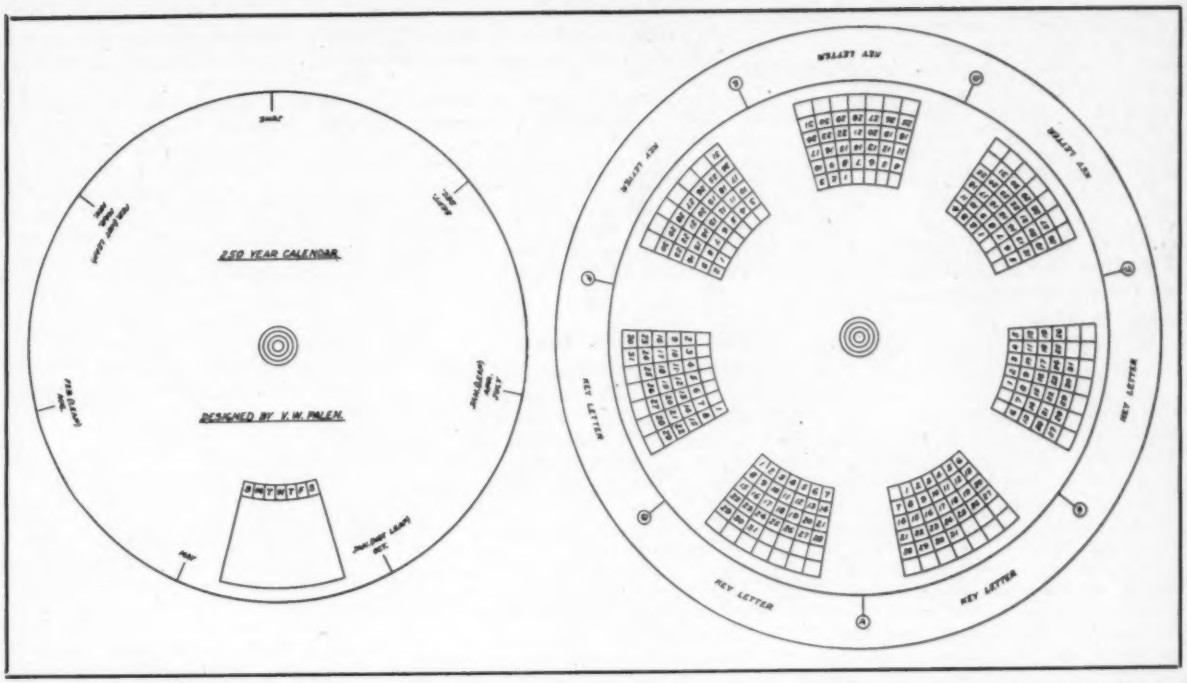
Unless otherwise specified, these knives are tensioned for a rim speed of 10,000 ft. per minute.—HENRY DISSTON & SONS, INC.

◆

Doctor Scoring

Here are a few suggestions which, if followed, will help to prolong the life both of doctors and rolls:

1. If carbon steel blades are used on wet stacks or wet creping, remove accumulation of rust by periodic scraping or sanding of the blades.
2. Throw back the doctors at frequent intervals, and examine blades for wear, burrs, adhesion of sizing and other foreign matter.
3. Do not permit excessive pressures.
4. Replace damaged blade holders which may cause uneven wear on rolls and blades.
5. Check setting of doctor blades with manufacturer's recommendations and be sure that doctor supports are rigid and do not vibrate.
6. Consider oscillation as a means of reducing scoring or other damage.
7. If possible, eliminate abrasive fillers used in some papers.—*Booklet No. 114,* FARREL-BIRMINGHAM COMPANY, INC.



Reference Calendar

Here's a handy, simple calculator that will produce the calendar for any month during the years 1753 to 2000.

Merely find the year you are concerned with in the accompanying table of key letters and note whether a leap year.

Using the dial, set the proper month opposite the proper key letter and the correct calendar for that year and month will appear in the window.

For simplicity, all months are shown with 31 days. The operator will know, of course, that the months January, March, May, July, August, October and December have 31 days. There are 30 days in April, June, September and November. February in leap year has 29 days—otherwise 28.

This little device can serve for the current calendar and is handy to have around all offices—particularly accounting. For instance, in comparing the business transacted today with that of five years ago—one wants to know if the date five years ago occurred on a Sunday or holiday. Correspondingly, if the current date fell on Wednesday—it may be desirable to know the date of the corresponding Wednesday five years ago.

How to Assemble—Cut out both discs (also window) and mount on cardboard with rubber cement. Punch the center holes carefully—then insert a small brass bolt in the holes. Washers, if used, will save wear and tear on the paper. The bolt should be tightened to give the proper pressure on the discs—they must hold their setting, yet turn easily. A drop of solder applied to the nut will make the assembly permanent.

How to Use Calculator—Find the year in which you are interested in the table. Then note the key letter at the top of the column in which this year appears. Apply this key letter to the calculator.

	A	B	C	D LEAP	E	F	G	A	B LEAP	C	D	E	F LEAP	G	A	B	C LEAP	D	E	F LEAP	G	A	B LEAP	C	D	E LEAP	F	G	A LEAP
																													1753
18th Century	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	
	97	98	99						1800																				
																					01	02	03	04	05	06	07	08	
19th Century	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	
	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	
	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	
	93	94	95	96	97	98	99						1900																
																									01	02	03	04	
20th Century	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	
	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	
	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	
	89	90	91	92	93	94	95	96	97	98	99		2000																

For instance, the year 1776 has a key letter of C. Set C opposite July. Now note that the 4th of July, 1776, was on a Thursday.

The present style calendar was adopted by England and her colonies in 1752. Therefore, the accompanying table begins with the year 1753.—V. W. PALEN, *Editorial Service, Westinghouse Electric & Mfg. Company.*

Paper Machine Lubrication

A machine tender always should be concerned with the condition of lubrication of his paper machine. Not that he should lubricate the machine himself, that is the job of an oiler, but rather he should know the lubrication schedule and see to it that all bearings receive the proper lubricant at the right time.

The machine tender should watch the hard-to-get-at bearings very carefully. If a journal cuts through a bearing and a felt or wire is spoiled as a result of it, the machine tender is apt to receive the same reprimand as the oiler.

There are days when a machine tender cannot find the time to inspect the belt, motors, shafting, gears, etc., of his machine. However, these units are under the observation of the oiler a number of times a day. If the oiler notices that a belt is breaking or that a cap of a pillow block is working loose, he should report

such observations to the machine tender. It is then up to the machine tender to get the necessary repair work done by the department to which such work is delegated. Preventive maintenance of this kind will prevent a shaft from breaking, a belt from being ruined, or possibly a long shutdown of the machine caused by such breakdowns. —ARCHIE MCCAFFERY.

◆

Flexing Applications of Flexible Metal Hose and Tubing

Where there is motion in a plane, flexible metal hose and tubing shall be installed in a plane parallel to the direction of motion and with the stationary end located midway between the two extremes. The length of the tubing shall be adequate to maintain a minimum radius of bend, and a straight portion (A) on either end equal to ten times the inside diameter of the tubing used.

Where there is motion about a pivot, flexible metal hose and tubing shall be installed in a plane parallel to the axis of motion (A). The stationary end (B) is located on the plane bisecting the angle of motion of the moving arm. The moving point (C) is located on the moving arm. An equal distance must be maintained between moving point (C) and stationary point (B) to the axis of rotation (A).

When so installed, the tubing will move in perfect symmetry with the motion of the machine and give maximum life and durability.

In those cases where such an installation is not permitted due to mechanical interference, it is recommended that the tubing be installed in a plane perpendicular to the pivot axis (A) and that the length of tubing be sufficient to permit a minimum radius of bend and with the minimum amount of strain of the tubing at the extreme positions.—TITEFLEX, INC.

◆

How to Care for Motor Insulation

Care of insulation is a major feature of motor maintenance. Motors should always be stored in a dry, clean place until ready for installation. Heat should be supplied to protect against alternate freezing and thawing.

Motors that have been long in transit in a moist atmosphere, or idle for an extended period, should be thoroughly dried out before being placed in service—since machines sometimes "sweat" as a result of moisture condensation.

Low-voltage current can be passed through the windings, electric heaters or steam pipes can be used for protection. In the case of extended idle periods, tarpaulins may be stretched over the motor and a small heater put inside to maintain the proper temperature.

Motors that have become wet can best be dried out by passing current through the windings, using a voltage low enough to be safe. About 25 per cent of normal voltage is usually safe.

If possible, thermometers should be placed on the windings to see that they are heated uniformly. Temperatures should not exceed 90 C. (195 Fahr.) for Class A insulation. This method is particularly effective on high-voltage motors, where the insulation is comparatively thick.

Heat can be supplied externally by placing heating units around the machine, covering with canvas, and leaving a vent at the top to permit moisture to escape. There must be a circulation of warm air over all the surfaces to be dried.

Twelve-inch fans set to blow air across the fronts of "glow heaters" and into the lower part of a motor from opposite sides will produce excellent results. Small motors can be placed in ovens, if Class A insulation temperature limits are observed.

The time required for drying out depends on size and voltage of the motor. Insulation resistance measurements should be taken at intervals of four or five hours until a fairly constant value is reached. These tests show the general condition of the insulation.

The resistance should at least equal the recommended AIEE standard, which is:

$$\text{Megohms} = \frac{\text{Rated voltage of the machine}}{\frac{\text{Rating in kva}}{100} + 100}$$

Insulation resistance tests should be made before and after a high-potential test.

High-potential tests should be made after drying out or after repairs, to check the dielectric strength of the insulation.

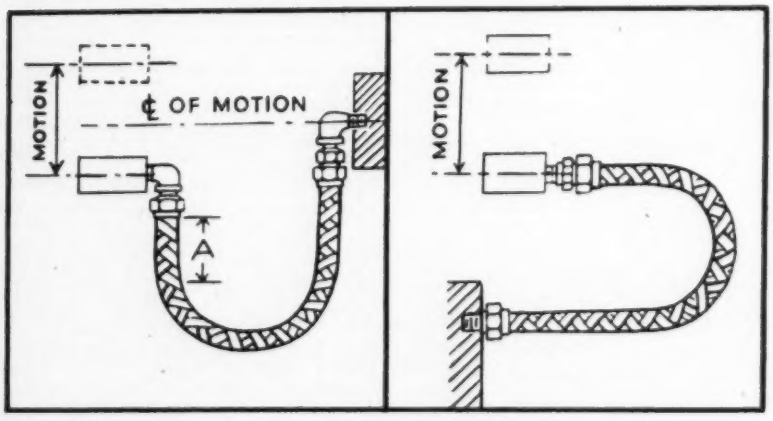
New windings should successfully stand a high-potential test of twice normal voltage plus 1,000. Motors that have been in operation for some time should be tested by this method, *after thorough cleaning and drying*, using a voltage of about 150 per cent of normal voltage, applied for one minute.

Small high-potential testing sets are available for such work. GENERAL ELECTRIC COMPANY.

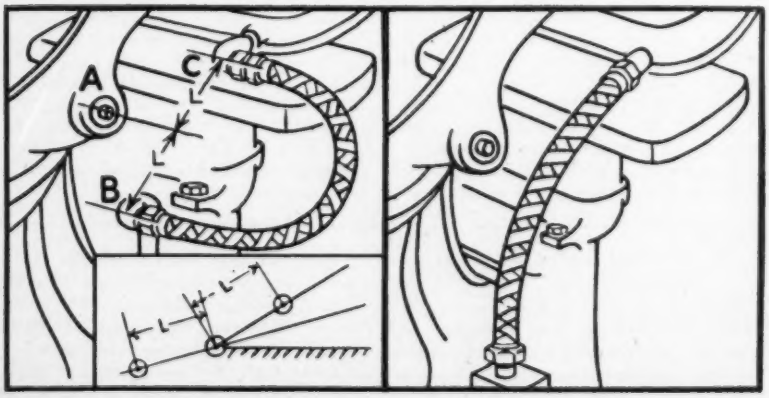
◆

Removing Digester Hang-Ups

Pulp left in a digester after a blow, for whatever reason, must be removed previous to filling the digester for the next cook. This operation can be done by washing the pulp from the digester into a tank or onto the floor under the digester. The digester also can be reblown. To reblow a digester, water is added to the remaining pulp until it is covered, the digester cover is then put back on the digester, and steam is turned on until there is sufficient pressure within the digester for completing the reblow. The reblowing is done in the same manner as for a regular blow.—WILLIAM S. HODGSON, THE PAPER INDUSTRY AND PAPER WORLD.



Motion in a plane: Left—Correct; Right—Incorrect.



Motion about a pivot: Left—Recommended; Right—Approved.

Maybe you'll feel the same way about Taylor Spiral savings–

JUST glance at the piping services listed below. These are the services that most pipe users would call the ordinary, every-day kind. Therefore the pipe they select for such uses is the ordinary, every-day kind of pipe—the time-honored Standard Thickness kind.

Of course Standard Thickness pipe will handle such requirements, but it has one big, basic fault. It is a lot heavier than most jobs of this kind require. Since it is heavier, it costs more to buy, more to install, more to support. And today it has the added fault of wasting vital steel.

How do you know this to be true? Simply because it has been repeatedly proved that Taylor Spiral Pipe, weighing about half as much as Standard Thickness Pipe, can handle any of these moderate and low pressure applications with strength and service life to spare. Yes, and often at an installed cost of half that of the heavy pipe it replaces!

This is simply because Taylor Spiral is so strong for its weight. The spiral seam, running from end to end, does the trick—makes it the strongest type of pipe on earth, size for size and gauge for gauge.

Changing to Taylor Spiral Pipe for services like those listed is made easy by the complete range of sizes and fittings. Thicknesses range from 18 to 6 gauge; sizes from 4" to 42"; joint lengths up to 40 ft. All types of end joints and couplings, all kinds of fittings and specials or fabricated assemblies, are produced by Taylor Forge, assuring a complete service and undivided responsibility.

TAYLOR FORGE & PIPE WORKS

General Offices & Works: Chicago. P. O. Box 485 ★ New York Office: 50 Church St. ★ Philadelphia Office: Broad Street Station Bldg.

TAYLOR SPIRAL PIPE

CHANGE TO TAYLOR SPIRAL PIPE FOR:

- High and Low Pressure Water Lines
- Low Pressure Steam and Air Lines
- Steam and Diesel Exhaust Lines
- Vacuum and Suction Lines
- Blower Piping
- Sand and Gravel Lines
- Industrial Gas Lines
- Oil and Gas Gathering Lines
- Swing Pipe
- Spray Pond Piping
- Hydraulic Mining
- Dredge Lines

THE

SMITH & WINCHESTER MFG. CO.

• Since 1828 •

continuously
we have served the

PAPER INDUSTRY

with the finest in

PAPER MILL MACHINERY

During the progress of World War II, our plant and facilities have been devoted primarily to the war effort.

Replacements, or repairs to your machines, can be furnished under required priority rating.

"Undercut" Trimmers
Paper Bag Machinery
"Rainstorm" Shower Pipes
Stuff Pumps — Jordans

—Office and Plant—
South Windham, Conn.

A Technical Librarian in Industry*

LUCY O. LEWTON
Research Librarian and Chief Statistician
Freeport Sulphur Company

Describing the functions of a technical library and the duties of its librarian, Miss Lewton states that as a shock trooper for the research front, the technical librarian or "desk researcher" must be a linguist, an editor and writer, an administrator, and even something of a patent attorney.

▶▶▶ INDUSTRIAL RESEARCH as carried on today is an organized activity, which means that each experiment is a forward step built on the preceding successful result reported by some other investigator. So, before any laboratory program is embarked upon, a great deal of "desk research" must be done. Technical literature must be thoroughly combed to get a comprehensive view of the state of the art, to prevent duplication of work already accomplished as well as to supply the most efficient test methods. Often the end-results of the tests themselves cannot be properly interpreted until literature furnishes a key to their explanation.

In former days, only the discoveries of fundamental science, the results of "pure" research carried on at university centers, were published. Today, the age of trade secrets is over, and the worth-while results of industrial research are disclosed sooner or later in technological and trade publications. The many and rapidly accumulating volumes of technical literature are the storehouses where our inheritance of tested facts, the fruits of past research, are deposited. Here they can be utilized by the humblest novice as well as by the most celebrated inventor. This scientific heritage must be collected, classified, and summarized—and that is the role of the technical library.

"Imagineering" (a word recently coined to describe inspired, long-term research) may spring from an idea—but ideas do not spring "full-armed from the forehead of Jove." More often they are the result of an isolated fact casually noted in book or article, a seed left to germinate in the mind of the investigator into the sudden full-bloom research hypothesis popularly called a "hunch." That is why, in the intricately organized subject catalogues of technical libraries, there may be found references of seemingly indirect purpose to the subject under which it is classified. These may concern an unusual reaction, a universal scientific law, or they may describe an ingenious apparatus. All are signals to the experienced technical librarian; they point the way for the trained mind of the "imagineer" to make the correlated deduction—often the first step to a brilliant research result.

Many industrial corporations carrying on research maintain their own special libraries connected with their development department. The Special Libraries Association has 270 such company libraries registered in its science-technology group.

Service Gauges Effectiveness

Quite often company libraries are not libraries in the layman's accepted view of a pine-panelled room with a complete book and magazine collection. A special library is a growing body of collected experience on one or more subjects, classified and organized so as to be readily available for use. It may consist merely of clippings or abstracts, or the company's own research report file. The measure of its effectiveness is not to be gauged by its physical size or possessions, but rather by the productive service it renders not only to the research group, but to every department of the corporation requiring informational data. Those companies which attempt to set up libraries by buying books indiscriminately or by employing a competent librarian for a few years, and then leave the library in charge of untrained clerks, weaken a live asset, since library service under a technically-trained librarian grows and improves with the years as the librarian matures in knowledge of the company's business.

In those cases where proximity to large institutional libraries renders a large company library plant unnecessary, it does not follow that no need exists for a technical librarian. Even as a curate without a church can still be a factor for good in a community, so a technical librarian without a library becomes the company's information specialist thoroughly versed in technology. Always trained in the special subject of the field, often a chemist or engineer who found the lure of digging facts from books more exciting than adventure in the laboratory, sometimes a former successful researcher with patents to his credit, a technical librarian fully understands the research viewpoint. Such a specialist is fitted to obtain and predigest information required by the laboratory investigator who does not have the time or technique to dig in the large libraries.

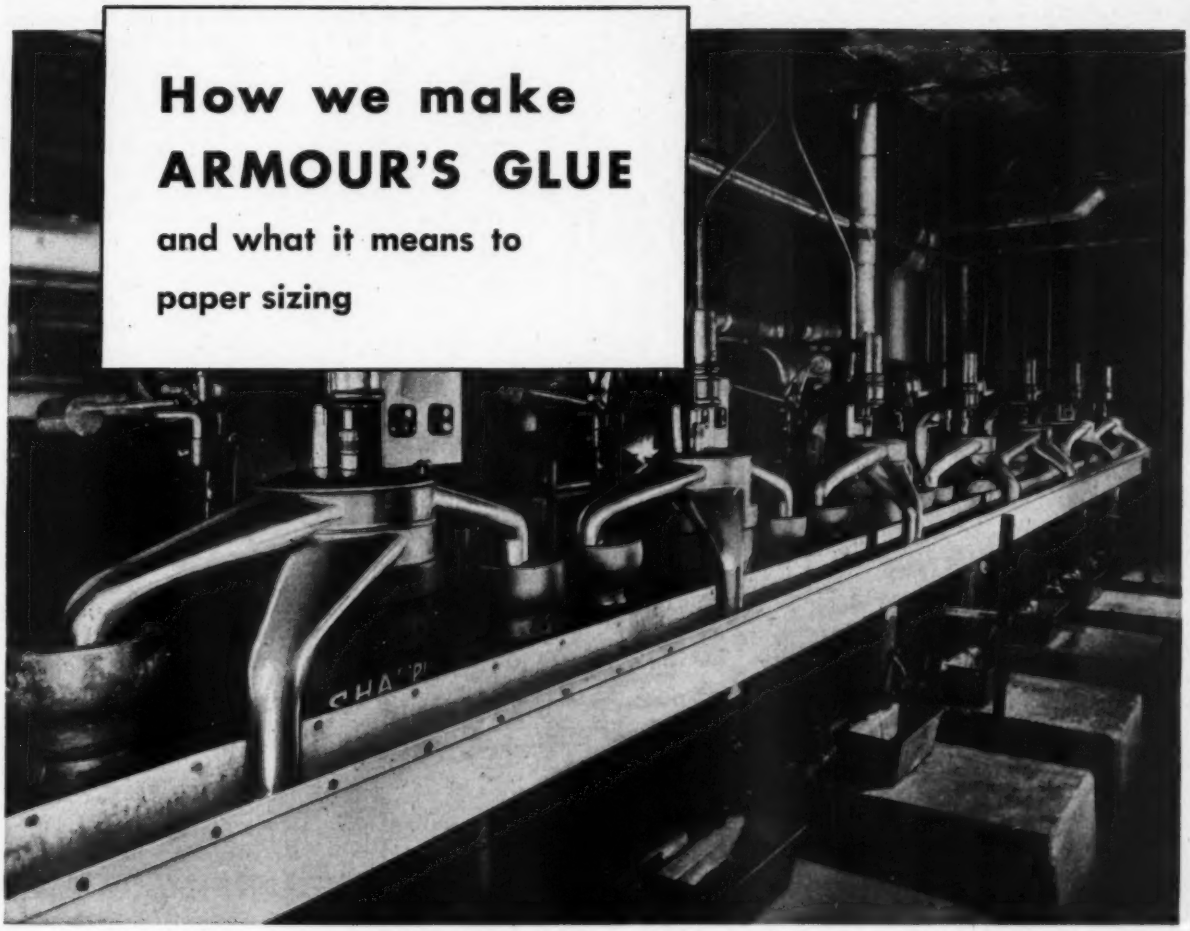
A technical librarian, therefore, can act as the shock trooper for the research front, for to wend one's way efficiently through subject catalogues of the institutional libraries, to know sources and special collections of institutions, to be able to dig out the one significant fact from these vast storehouses is a science and art in itself, and it has given rise to the profession of "desk researcher" or "literature searcher."

A linguist (knowledge of at least two modern languages is a necessity), this desk researcher must also be editor and writer who issues reports, abstract bulletins, and

(*) Reprinted from *Executive Service Bulletin*, published by the Policyholders Service Bureau, Group Division, Metropolitan Life Insurance Company.

How we make ARMOUR'S GLUE

and what it means to paper sizing



These separators remove waste from the glue liquors

This battery of precision separators is what you'd expect to see in a creamery, rather than in a glue factory. But these machines serve a very important purpose in the making of Armour's Hide Glue.

High-speed separators . . . each with a precisely-finished 65-vane rotary unit . . . give the best and most thorough means of removing all foreign material from the glue liquors before evaporation. This is vital because the glue liquors must be clean, clear and one hundred per cent glue, batch to batch. An additional guarantee of the glue's purity is found in the care the separators get. Each is steam-washed after *every* operation. And a trained operator is on hand 'round-the-clock to maintain them at peak efficiency.

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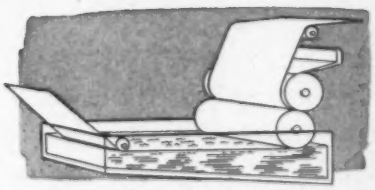
Better performance in your sizing is the end result of this and every other step in the making of Armour's Hide Glue. It's pure, clear, clean and completely uniform from batch to batch. The high jelly strength, viscosity and tensile strength of Armour's Hide Glue



are constant characteristics . . . ones you can depend upon in every order you receive.

At present demand for certain grades of Armour's glue is greater than the supply. And while we may be unable to supply exactly the grade you want, we will be glad to discuss your problems with you with a view to suggesting more efficient use of glue that is available.

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critically evaluated summaries on research topics as well as bibliographic compilations. Also, the researcher must be somewhat of a patent attorney, for in legal battles over patent interferences, citations of technical literature are hurled at each other by the contending parties. Furthermore, the company technical librarian must be an administrator to handle the clerical staff and lay out routine work. All of these talents must be superimposed on a knowledge of the profession of librarian in the narrower sense, familiar with indexing and cataloging technique, in order to collect, record, and classify current and company research data as sources for future special assignments.

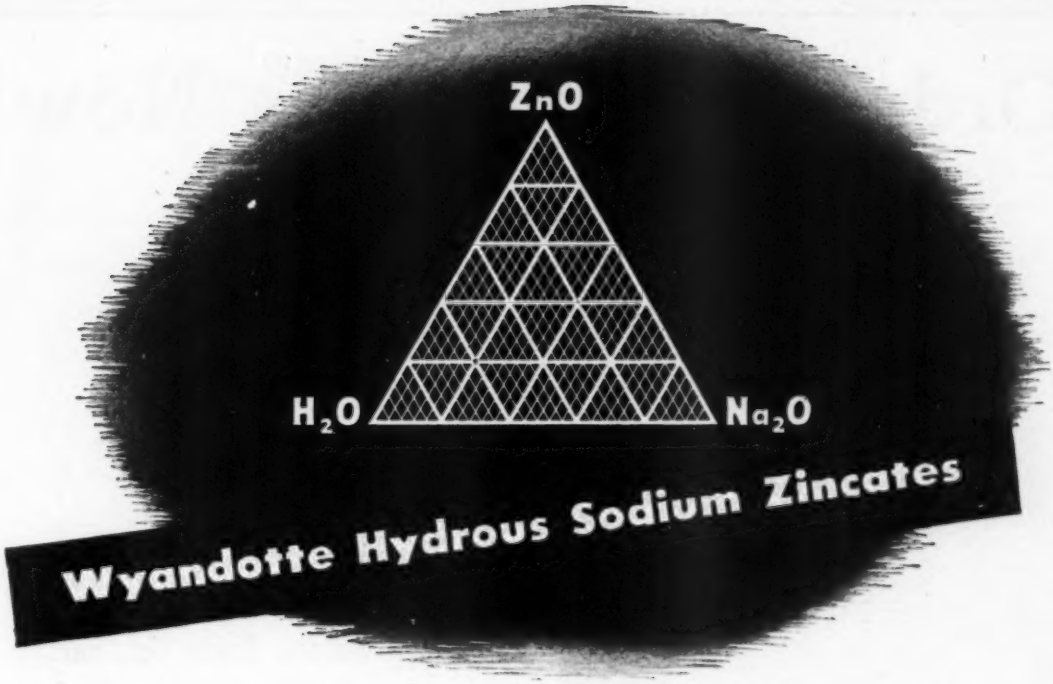
Primarily, however, a company technical librarian is a scientist, engaged in research at a desk instead of at a laboratory bench, and should therefore have the status of such. From the standpoint of organization, the technical librarian should report to the research director or to an official appreciative of the special qualities of patience, intuition, imagination, and objective orderly habit of thought required, rather than to an official accustomed to measuring results in the light of immediate sales volume and profit margins alone.

The research and statistical library department of the Freeport-Sulphur Company has been organized under this newer concept of a technical library service, emphasizing the productive fact-finding function, for the company as a whole, of a working researcher-librarian and a specialized information staff rather than a private collection of books under a custodian. The library is a separate department with its own budget, but the librarian herself is under the guidance of the technical director of the company. The physical plant of the library, located in the head office of the company, consists of the minimum research tools—basic texts, handbooks, directories, annuals and catalogues essential for the rapid production of spot information, because for detailed studies the three largest institutional technical libraries of New York City are only a few blocks away. The basic texts, classified by a modification of the Dewey system, are kept in various offices where they can be at hand for most use, rather than in a central location.

Review of Technical Literature

Since sulphur runs like a golden thread through all the technologies of peace and war, such as fertilizers, agricultural insecticides, explosives, heavy chemical industry in the form of sulphuric acid, pulp and paper, rayon, rubber, etc., the current technical literature in these fields, as well as on subjects directly connected with sulphur mining, is watched for new developments.

As the company is actively expanding into new fields, the new subjects followed by the library are growing almost monthly, and collections of clippings and background information are struggling to keep one step ahead of the line of the company's developing interests. Of 75 journals subscribed to, 54 are regularly reviewed and abstracted. A library bulletin of these abstracts from current technical, trade, and patent litera-



CHEMICALS WITH *U. C. P.

After years of research and development by Wyandotte, laboratory samples of the various hydrous sodium zincates are available and commercial quantities of several of the zincates can be made available for important uses. All of the hydrous sodium zincates are potentially available in large quantities. Chemicals of "undiscovered commercial potential," they have promise of immediate important commercial functions, such as:

- **Purification of water supplies.**
- **Boiler water treatment.**
- **Clarification of cannery and other industrial waste waters.**
- **Basis for colloidal suspensions of zinc oxide or zinc hydroxide.**
- **Source of zinc in zinc-plating operations.**

Wyandotte Chemicals' technical staff is always ready to talk over with you the properties and applications of hydrous sodium zincates. Users of alkalies may find it profitable to investigate the possible benefits of these chemicals in their processes.

**Undiscovered commercial potential.*

PROPERTIES OF HYDROUS SODIUM ZINCATES

CHARACTERISTICS: White to light gray or brown; flakes, granules or powder. The more alkaline zincates dissolve in water without decomposition but the less alkaline forms hydrolize to colloidal zinc hydroxide or oxide. All ratios may be dissolved without decomposition in suitable alkaline solutions. Solutions precipitate and flocculate traces of calcium, magnesium, iron and other metals from solution.

RANGE OF COMPOSITIONS: Na_2O: ZnO ratios from 100:1 to 2:1. Combined water content approximately ½ zinc oxide content by weight.

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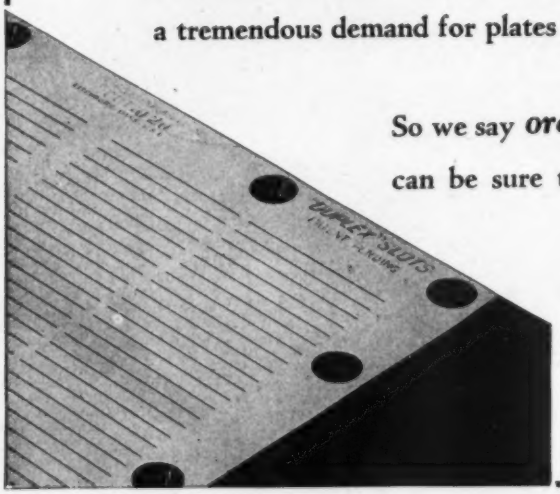

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ture, divided into subject sections representing statistics, commercial news, production technology, and application technologies, and bearing a list of new books received, is issued semimonthly and distributed among the executive personnel of the home and field offices, and the technical staff at the sulphur mines. The bulletin serves as a constant reminder of the work of the library department, and constitutes its best publicity.

Because of adjacency to the extensive magazine resources of the big libraries, the file of journals is kept for only three or four years, unbound, most of the important articles being clipped and filed by subject in a vertical file. A subject card file of abstracts cut from the library bulletin is also maintained, as well as a patent specification file by number, and patent card file by subject.

The ordering of books, printed matter, and placing of subscriptions to periodicals for the entire company, and their circulation, is part of the routine of the library. Magazines are sent to the reader's desk, and each reader is annually sent a list of all magazines received in the library so that he can check those he wishes to see regularly. Another regular task is to obtain photostats and translations for the technical men at the plants in Texas, Louisiana, and Cuba

"Attention Notes from the Library," on characteristic paper and bearing brief abstracts on items of particular interest, is a specialized routine library service to keep executives well-informed on important business developments, whether technical, economic, or legal. As the librarian must be kept in touch with the developing interests of the company in order to do an effective reviewing job and to keep abstracting pointed in the right direction, she sits in on the company's regular research conferences, to which she is able to contribute technologic trends. She also acts as the recorder of these conferences.

Bibliographies requested by plant personnel as well as the technical director in the home office are compiled on various problems, whether apparatus failure, a new process, a patent search, or as background for mining exploration. Bibliographic background is furnished for technical papers and annual reviews of the sulphur industry.

The official sources of statistical information, as well as confidential and company production figures, are analyzed by the library staff and broken down into appropriate subject tables. The library, therefore, has become the official company compiler of statistical studies, and issues routine monthly production statements and comparisons of foreign and domestic sales. Because of watching the pulse of technical developments among sulphur-using industries, the librarian aids in establishing the annual and semiannual sulphur sales budget. Specialized statistical studies on world ore reserves and markets are carried out, these including schematic charting and maps.

As much of the correspondence and many of the research reports of the company filed in a central files department deal with technical data requiring technical knowledge for proper subject filing, the indexing of this part of the central files has been placed under the supervision of the technical librarian, acting in an advisory and directive capacity to the central files staff.

Postwar Planning

All articles, speeches, and plans on postwar economy and reconstruction, whether idealistic or concrete, are circulated among Freeport executives, and the major part of the librarian's working time is at present spent on specialized reports related to planned postwar expansions, this involving studies of particular industries.

Technical librarians are facing *now* the problems of the postwar world. They must be a step ahead in building up a reservoir of information to anticipate the rush of requests for data on new markets, competitive materials, uses for newly-developed substitutes, and the like. It must be the self-assumed task of company librarians today to stimulate the executives in thinking of "winning the peace." Many companies, like Freeport Sulphur, are quietly but surely laying the economic foundations for a happier postwar world through full employment by postwar expansion activities. So Freeport Sulphur research begins in the library and continues *ad infinitum*.

"Success" narratives of research are common, but the stories of the research technical library are rarely heard. It is not only to the laboratory worker that a technical librarian can render service. To those executives with more commercial problems,

You can see a lot through a PINHOLE

PAPER MILL Executives, for example, can see the loss of thousands of pounds of steam, air or water in a valve leak no bigger than the average pinhole.

In terms of pounds and money, a little $\frac{1}{32}$ inch valve leak can pile up real losses, as shown on the card. Here are the figures taken from long-term tests, based on normal pressures.

Larger leaks produce losses in far greater proportion than on a basis of comparative size. For instance, a $\frac{3}{8}$ inch leak brings a loss of 460,000 lbs. of steam, normally costing $276.00 a month!

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Losses in steam, air, water — and DOLLARS, by leakage, are only the *first costs*. Shutdowns, replacements and high labor costs follow . . . *unless* you are equipped with a Dexter Valve Reseating Outfit.

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8

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responsible for the presentation of a product to its market, valuable information on special properties permitting informational type of advertising, is available when properly "dug out of the literature." In closely following technical developments reported in the literature, an improvement in a product often can be suggested which will enable it to invade a new market, or may establish a newer use in accordance with modern technology. Keeping up with the literature will often suggest means of commercially utilizing a waste material and furnish facts to improve labels or solve packaging troubles, and even aid in finding a trademark name without interference. Truly, a versatile technical librarian, even without a library, can earn her salt as an information specialist in a hundred different and useful ways.

The Special Libraries Association with a membership of 3,000 has an appropriate motto—"Putting Knowledge to Work." Above the door of an ancient Chinese library there were inscribed these lines: "Ten thousand yesteryears lie buried here." It is the function of the company technical librarian to see to it that those yesteryears are disinterred and used, to expedite industrial research for today and tomorrow.

Convention Papers . . . Abridged

Sodium Peroxide Bleaching of Mechanical Pulps—General Description of the Process

J. S. REICHERT, Manager,
Peroxygen Products Development,
Electrochemicals Department,
E. I. du Pont de Nemours & Co., Inc.

The sodium peroxide process for bleaching mechanical pulps includes the following steps:

(1) Rapid and thorough mixing of the sodium peroxide bleaching solution with the pulp slurry in controlled proportions.

(2) Storing the treated pulp long enough to permit the bleaching to go to completion.

(3) Thorough mixing of the bleached pulp with a neutralizing and reducing agent, preferably sulphite cooking acid.

The chemicals used in the bleaching process are sodium peroxide, sodium silicate, sulphuric acid, magnesium sulphate and sulphite cooking acid.

Sodium peroxide, marketed by du Pont under the trade name "Solozone" DFF, is a dustless, free-flowing, pale yellow, granular solid. It is an alkaline bleaching agent containing 20 per cent active oxygen, stable at ordinary temperatures when kept dry in air-tight containers. With proper technique, it can be dissolved in water with little or no loss of active oxygen. It is supplied in 75 lb. pails and 400 lb. drums; devices are available for convenient and safe handling of "Solozone" in the mill.

The amount of sodium peroxide used in the bleaching process may be varied to produce the desired degree of bleaching. The most practical range appears to be 1.25-2.0 per cent with resulting brightness increases in the range 7-11 G.E. units.

For use in this process, sodium silicate should be clear, water-white, and free as possible from metal impurities. Since sodium peroxide and sodium silicate together supply more than the amount of alkali required for the process, the value of the silicate lies in its SiO_2 content rather than in its Na_2O content. A 41.5 Bé silicate containing 29.0 per cent SiO_2 and 8.9 per cent Na_2O is satisfactory.

Sodium silicate has the properties of a detergent and a penetrant. It buffers the bleaching solution and aids in maintaining the *p*H in the desired range. It forms a protective coating on the surface of metals and inhibits corrosion of equipment. It also has a stabilizing action on peroxide solutions under the conditions which prevail in the bleaching process. The amount of the 41.5 Bé silicate used in the bleaching process is in the range of 4.0-5.0 per cent.

For good bleaching results, the total alkali content of the bleach liquor must be controlled within rather close limits. Sodium peroxide is basically a combination of anhydrous caustic soda and active oxygen. Part of the alkali introduced into the bleaching solution as sodium peroxide must be neutralized with sulphuric acid. The amount of sulphuric acid used in the bleaching process varies with the percentage of sodium peroxide used and with the pulp consistency. With 2 per cent sodium peroxide and a pulp consistency of 5 per cent, the preferred amount of sulphuric acid (66 Bé) is 1.7 per cent of the weight of the pulp.

Magnesium sulphate has a remarkable stabilizing effect on alkaline peroxide solutions under the conditions which prevail in the bleaching process. The stabilizing effect is obtained with very small amounts of magnesium sulphate, e.g., five pounds per 2,500 gallons of bleaching solution.

The most convenient and economic material for use in the neutralizing and reducing

This is the second installment of abridgments of papers presented at the annual meeting of the **Technical Association of the Pulp and Paper Industry,** held in New York City, February 14-17, 1944. Monthly installments of these abridgments will appear in succeeding issues.

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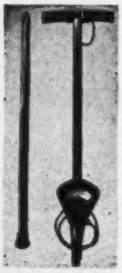
Faulty drying roll temperatures that cause much of the spoilage and reduction in quality of paper can be located quickly and easily with the CAMBRIDGE Surface Pyrometer. With the rapid labor turnover of today it is important to reduce the human equation to a minimum. Checking roll temperatures with this accurate, easy-to-use instrument permits increased production with safety. Send for descriptive bulletin.



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The GK is s-m-o-o-t-h — vibration and chatter are "out" — even with the strongest grinding pressure because of the solid, compact, extra heavy exclusive Covel-Hanchett construction features for supporting the carriage, knife bar and grinding wheel.

Knives can be ground to closer tolerances, for heavier cuts and increased production; while the tendency towards over-heating the work is reduced.

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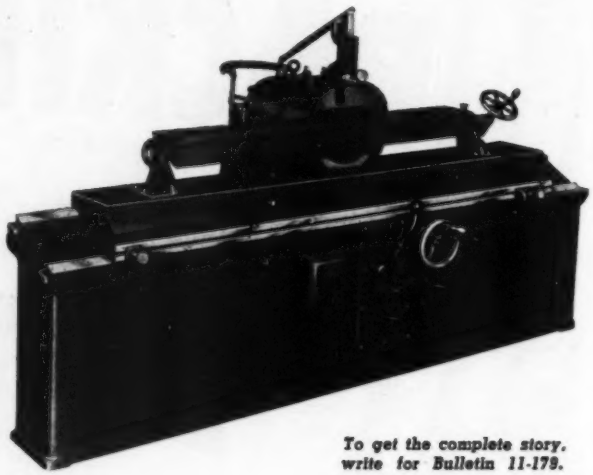

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treatment in the final stage of the process is sulphite cooking acid.

In case sulphite cooking acid is not available, other reducing agents may be used. Sodium bisulphite or sodium metabisulphite will both function satisfactorily as the reducing agent, but when a bisulphite is used, it is necessary to use larger quantities of an acidic material such as sulphuric acid or alum for lowering the *p*H to the desired value.

"Solozone" is an active oxidizing agent and *in the dry state* must not be allowed to come in contact with oxidizable materials such as organic matter in the form of pulp, sawdust, starch, cloth, etc. "Solozone" should be stored in the original containers in a dry, fireproof location, away from all flammable and combustible materials. In case the container of "Solozone" is not all used at one time the partially emptied container should be kept tightly covered; when emptying a container the "Solozone" should be removed completely. "Solozone" accidentally spilled should be covered with liberal quantities of soda ash and flushed down the sewer. In case flushing is impractical, the mixture of "Solozone" and soda ash should be shoveled into a pail, dissolved in water and poured down the sewer. Goggles and rubber gloves should be worn by operators when "Solozone," sodium silicate, sulphuric acid or solutions of these compounds are handled. If these chemicals come in contact with the skin, they should be washed off with large quantities of water.

In the selection of tanks, pumps, mixers, agitators and control devices for operating the process, the existing equipment and the floor plan in each specific mill must receive consideration.

The diagrammatic layout of equipment shown in Figure 1 is typical for operating a triple bleaching tank system at a rate of about one ton of pulp per hour; Figure 2 shows a similar layout for operating a single bleaching tower system. The equipment shown in Figure 1 is as follows:

Tank "A" for Preparing the Bleaching Solution (Figure 1) is a 3,000 gallon cylindrical, tile-lined concrete, or rubber-lined steel, or wooden (cypress or yellow pine)

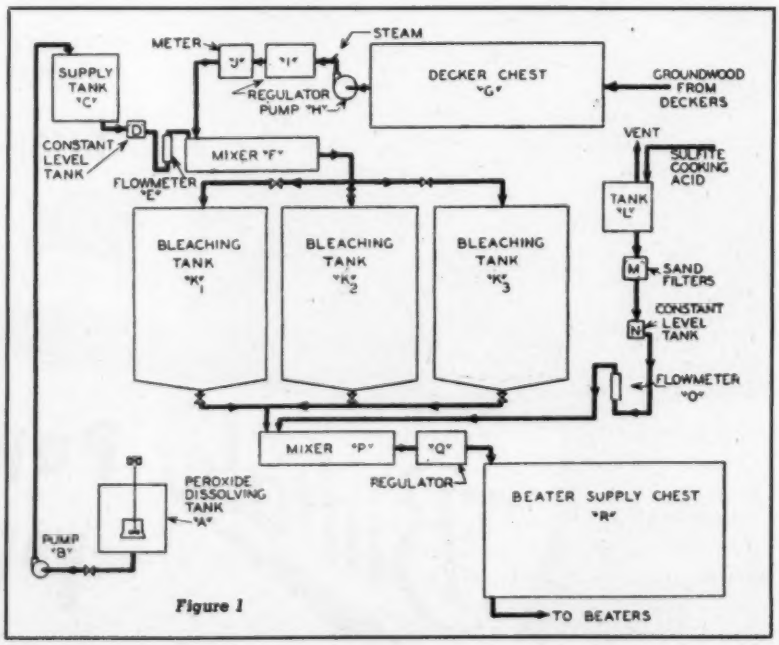

Figure 1

LUNKENHEIMER VALVES

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Fig. 16
"Renewo" Globe

Fig. 1640
"King-clip" Gate

In the heavy duty that Lunkenheimer Valves are doing on every front — industrial, maritime, army and navy, chemical, petroleum, synthetic rubber — a prime attribute is *lasting* quality . . . that inherent quality that comes of correct engineering, simplicity of design, and "know-how" manufacturing born of long experience.

These features in Lunkenheimer Valves are proving a boon to maintenance crews, in uninterrupted performance, low maintenance expense, and ease in making necessary repairs . . . in short, better service.

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SIMPLICITY OF DESIGN MEANS EASIER MAINTENANCE

Fig. 1630
Iron Body Gate

Fig. 1938
Steel Gate

Fig. 2125
Bronze Gate

Fig. 123
"N-M-D" Globe
(Non-Metallic Disc)

BRONZE, IRON, STEEL AND CORROSION RESISTANT ALLOY VALVES, 125 TO 2500 LB. S.P.; BOILER MOUNTINGS, LUBRICATING DEVICES, AIRCRAFT FITTINGS

tank, equipped with stainless steel (or ordinary steel spray-coated with stainless) agitator and a stainless steel or glazed tile draft tube to provide violent churning. A stainless steel outlet nipple and a stainless steel pipe and valve (or rubber hose with clamp) lead to Pump "B."

Pump "B" for Transferring the Bleaching Solution from Dissolving Tank "A" to Supply Tank "C" should preferably be of stainless, spray-coated stainless, or rubber-lined steel. An iron pump will give fair service. Stainless steel pipe or rubber hose lead to Supply Tank "C".

Supply Tank "C" for the Bleaching Solution is similar to Tank "A" with stainless steel pipe and valve (or rubber hose with clamp valve) leading to Constant Level Tank "D".

Constant Level Tank "D" is a 100 gallon stainless steel or wooden (cypress or yellow pine) tank equipped with a stainless steel float valve on the inlet pipe, adjustable to vary the flow of bleaching solution into Mixer "F."

Flowmeter "E" should preferably be the recording and controlling type. With a controlling type of flowmeter the Constant Level Tank "D" may be omitted.

Mixer "F" is a heavy duty, wood, rubber-lined, or stainless steel mixer which will mix the bleach liquor with the pulp *rapidly* and *completely.*

Decker Chest "G" is the conventional type with the bottom designed for complete drainage of stock at 5.5+% consistency.

Pump "H" should be suitable for handling groundwood at 5.5+% consistency.

Regulator "I" may be any conventional type which will deliver the pulp at a constant consistency and rate through Meter "J" to Mixer "F."

Pulp Meter "J" is any conventional (preferably rate recording) meter which will provide an accurate measure of the amount of pulp delivered to Mixer "F."

Bleaching Tanks "K_1"—"K_2"—"K_3" are cylindrical tile-lined concrete or wooden tanks with a capacity of 6.6 tons of pulp (moisture-free basis) at 5 per cent consistency. They are supplied with lines and valves to permit filling, standing and emptying in rotation. Conical bottoms permit complete emptying.

Supply Tank "L" for Sulphite Cooking Acid is a 1,200 gallon lead-lined cylindrical tank, covered and vented to the roof, and equipped with a lead outlet pipe to Filter "M."

Sand Filters "M" comprise a small twin set of conventional type sand filters to remove any colored sludge from sulphite cooking acid. They should be of lead construction and equipped for back washing with water.

Constant Level Tank "N" is similar to "D."

Flowmeter "O" is similar to "E."

Mixer "P" is similar to "F."

Regulator "Q" is similar to "I."

Beater Chest "R" is the conventional type with bottom designed for complete drainage. Agitation is desirable to prevent stratification and to supply pulp to the beaters at a constant consistency.

The Single Bleaching Tower System (See Figure 2) is the same as the Triple Bleaching Tank System with the exception of the following items:

Bleaching Tower "K" is a tile-lined concrete or wooden tower designed to provide for passage of the pulp through the tower from the bottom to top or top to bottom in a wad without channelling.

Pump "S" is designed to deliver the peroxide treated stock from Mixer "F" into the bottom or top of Tower "K." With a properly designed centrifugal pump Mixer "F" may be omitted, provided adequate mixing is obtained in the pump.

The following procedure suggested for operating is based on bleaching with 2 per cent* sodium peroxide at a pulp consistency of 5 per cent, a pulp temperature of 90 Fahr., and a bleaching rate of one ton of pulp per hour.

Preparation of the Bleaching Solution—Run 2,000 gallons of clean, cold water into the dissolving tank "A" and add 1,000 pounds of sodium silicate to the water with stirring. *At a slow rate* add 400 pounds of "Solozone" to the above solution with vigorous agitation. Add 340 pounds of 66 Bé, sulphuric acid, dilute to 2,500 gallons, continue agitation for about 10 minutes and pump the bleaching solution to Supply Tank "C."

The amounts of chemicals used in the preparation of the bleaching solution must be changed (a) if the consistency is higher or lower than 5 per cent, (b) if more or less than 250 gallons of the bleaching solution per ton of pulp is used in the bleaching operation, (c) if the composition of the silicate differs from the specifications given in a preceding section, or (d) if the *p*H of the pulp or of the mill water is abnormally high or low.

Bleaching Treatment—Through the Constant Level Tank "D" and Flowmeter "E," feed the bleaching solution into Mixer "F" at the rate of 250 gallons per hour. At the same time feed pulp from Decker Chest "G" through Consistency Regulator "I" and Pulp Meter "J" into Mixer "F" at a rate of one ton per hour; proper proportioning of pulp and bleaching solution is essential; mixing of pulp and bleaching solution must be rapid and thorough.

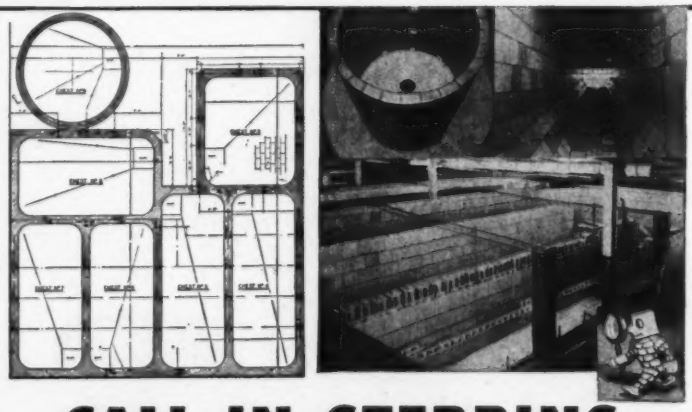
Bleaching Tanks "K_1," "K_2" and "K_3" are charged in rotation with the peroxide-treated pulp from Mixer "F," e.g., while "K_1" is being filled, the charge in "K_2" is being bleached and the charge from "K_3" is being delivered to Mixer "P." For continuous operation, the time cycle is 6 hours in each tank.

Neutralizing and Reducing Treatment—Sulphite cooking acid from Tank "L" is fed through Filter "M," Constant Level Tank "N" and Flowmeter "O" into Mixer "P." The rate of flow of cooking acid is adjusted to produce the desired *p*H (7-5) in the stock off the mixer. In Regulator

(*) Quantities of groundwood are expressed on the basis of moisture-free pulp.

Percentages of chemicals used in the bleaching process refer to pounds of chemicals per 100 pounds of moisture-free pulp, e.g., 2 per cent sodium peroxide means 2 pounds sodium peroxide per 100 pounds moisture-free pulp.

Brightnesses are expressed in terms of G.E. units.



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For sixty years, Stebbins have worked closely with pulp and paper mill operators, solving lining and tank problems peculiar to the industry.

Stebbins designers are thoroughly familiar with the chemical and mechanical requirements of the various processes involved.

All materials of construction are made by others to meet STEBBINS specifications based on sixty years of experience and hundreds of successful installations.

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Stebbins Engineering and Manufacturing Company

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NEW ROLLWAY BEARINGS

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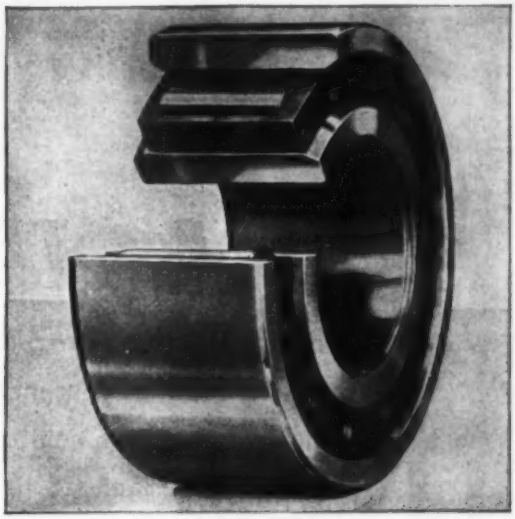
Let Us Analyze the Possibilities of Rollway Bearing Equipment in YOUR Plant

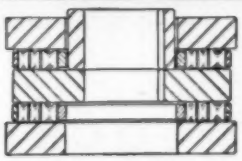
Think of it—just four Rollway bearings (two Couch Roll bearings and two Pressure Roll bearings) actually earned $250.00 per day or $75,000.00 per year for one plant. And when we say earned, we mean increased production that yielded a $75,000.00 gain in annual profit. *More than 20 times the cost of the bearings,* to say nothing of an average saving of 31 horsepower.

We don't say that every plant can show comparable gains simply by installing Rollway bearings, but we do believe that Rollway's right-angle loading of bearings will give the average plant:

1. **Marked increase in bearing life.**
2. **Marked improvement in the speed-load-life ratio of bearings.**
3. **Marked decrease in bearing replacements, shaft wear and maintenance time.**



Type CS Double Width Radial



Type DT Double Acting Thrust

For compound loads, diagram shows how SEPARATE radial and thrust bearings are used in combination:

- All radial loads carried at right angles to the roller axis.
- All thrust loads carried at right angles to the roller axis.

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Rollway's right-angle loading splits the load into its two simple components of pure radial and pure thrust—each carried by a separate roller assembly. It eliminates all compound loads, all oblique loads and resultants, insuring greater load capacity in any given dimensional limit. There's no pinching effect to force rollers out from between the races, hence less roller-end wear-back and less rubbing or sliding friction. Starting and running torques are both lower; power consumption goes down.

Write today; let a Rollway engineer make a free bearing analysis of your plant; let us estimate the savings or earnings you might reasonably expect from Rollway's Right-Angle Loading.

ROLLWAY BEARING COMPANY, INC., SYRACUSE, NEW YORK

BUILDING HEAVY-DUTY BEARINGS SINCE 1908 **BEARINGS**

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It still is possible to produce paper and fibre profitably when TENAX clothes your machines. Longer life helps! Tenacity and quick drying both help! . . . for more than fifty years TENAX has proved a valiant aid to many a successful mill. We still make deliveries promptly.

"Non-Users Are The Losers"

LOCKPORT FELT COMPANY

Newfane, N. Y. — U. S. A.

"Q" water is added to dilute the pulp to the desired consistency for the beaters. Beater Chest "R" should be agitated to maintain a uniform consistency in the stock delivered to the beaters.

Operation of the Single Bleaching Tower System is similar to that described for the Triple Bleaching Tank System. The Bleaching Tower "K" should be designed so the peroxide-treated pulp will pass from Mixer "F" through Tower "K" in a continuous wad without channelling.

If Pump "S" is designed to provide adequate mixing of the pulp with the bleaching solution, Mixer "F" will not be required.

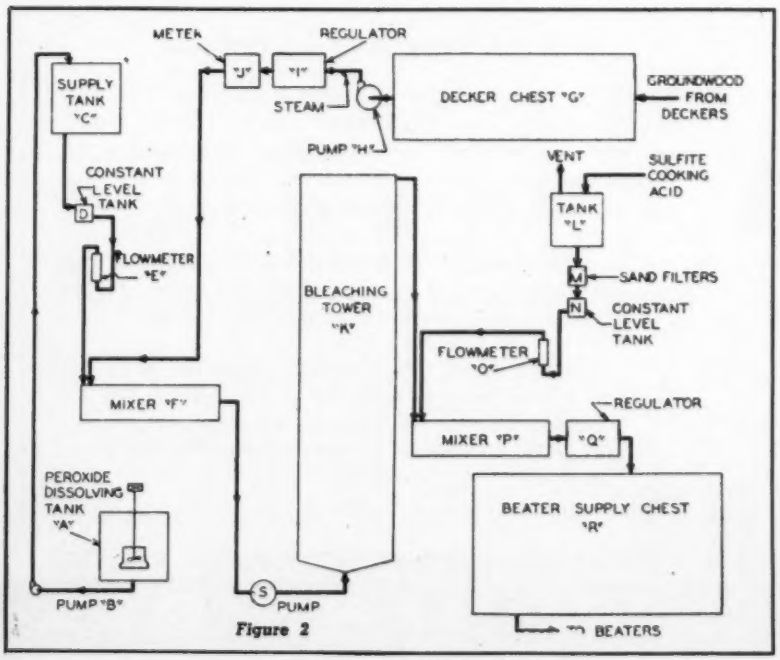

Figure 2

The *p*H of the peroxide-treated pulp decreases gradually and therefore, the *p*H determinations should be made not later than 5 minutes after the sample is taken. For best results a *p*H meter based on the glass electrode is preferred. The electrode may be placed directly in the slurry and after adjusting for temperature the *p*H can be read directly.

Quantitative laboratory studies on the recovery of stock in the bleaching process show little or no weight loss; i.e., less than 1 per cent. Yields in mill operations have not been determined with a high degree of accuracy; however, checks on plant inventories have indicated yields comparable to those obtained in the laboratory.

Bleachability of different species of woods probably ranges in the following order: poplar, spruce, balsam, hemlock and jack pine. There are some indications that a relationship may exist between the pitch content of the wood and its reaction to sodium peroxide bleaching.

Wood of the same species but grown in different localities has shown some variations in bleaching results; e.g., somewhat higher brightnesses have been obtained with Canadian spruce than with New England spruce when bleached under the same conditions.

Bleaching results obtained in a comparison of pulps prepared from freshly cut wood and from the same type of wood after aging are not conclusive. Other important variables may have entered into these experiments to obscure the results.

Flexibility

Our 78 years of service to the Paper Industry have included more than one period when, despite raw material limitations, ingenuity has enabled us to keep our paper manufacturing and paper converting customers always supplied with high quality products.

Flexibility has continuously been our watchword. And so, although some of our standard starches, gums and dextrines may not be readily available at all times, our Paper Laboratories have developed alternate materials to serve the same purposes. Working with our field staff of paper technicians, our Paper Laboratories are ready to help you solve your sizing, calender, coating and adhesive problems.

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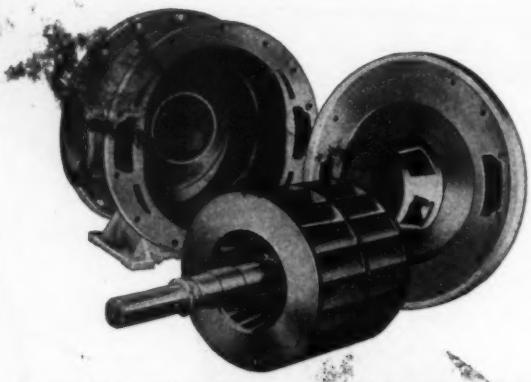


NASH VACUUM PUMPS HAVE ONE MOVING PART

Operating advantages made possible by the Nash principle, and present in no other type of vacuum pump, permit a new level of operating economy. Nash Vacuum Pumps have but one moving part, a rotor cast in one piece, and revolving without metallic contact. There are no valves, no pistons or sliding vanes, no internal parts requiring wear adjustment or lubrication.

NASH ENGINEERING COMPANY
SOUTH NORWALK, CONNECTICUT, U. S. A.

No marked differences in bleaching results have been observed with pulps ground to different degrees of fineness. It is possible that finely ground pulp will bleach in a shorter time than coarsely ground pulp but this conclusion is not definite.

In general, the greatest brightness increases are obtained when the pulp is bleached immediately after grinding. However, good bleaching results have been obtained with pulps stored for six months and longer.

Consistency appears to be an important factor in the bleaching operation. In the consistency range of 3.0-7.0 per cent the brightnesses obtained in the "Solozone" bleaching process are higher at the higher consistency.

A study of the density of groundwood (lb./cu. ft.) at different consistencies (0-50 per cent) in towers of different heights is in progress. The trend of the data indicates practically a straight line relationship between density and consistency at the lower consistencies. This straight line relationship between the density and consistency probably does not continue at higher consistencies, i.e., when the interstices between the fibers are no longer filled with water. The packing effect on bulk density in towers of different heights also becomes a more important factor at these higher consistencies.

Bleaching at higher consistencies requires more dewatering equipment, involves higher costs for dewatering, and mixing the bleach liquor with the pulp becomes more difficult. The factors favoring higher consistencies are a smaller bleaching tower (due to the higher bulk density of the pulp and the shorter bleaching period), possibly a higher brightness in the bleached pulp, and use of little or no steam to maintain the desired temperature.

Water of good quality is an important factor in the production and bleaching of mechanical pulps and also in the conversion of the pulps into papers.

The catalytic metals in the mill waters are likely to be in an active form and are more apt to have an adverse effect on the bleaching results unless steps are taken to deactivate them. Deactivation of these metal catalysts may be accomplished by the addition of magnesium sulphate to the bleaching solution, to the pulp or to both.

Proper proportioning of the chemicals in the preparation of the bleaching solution, as well as proper proportioning of the bleach liquor with the pulp in the bleaching treatment, have an important bearing on the bleaching results.

Temperature has a marked effect, not only on the rate of bleaching, but also on the brightnesses obtained in bleaching. The practicability of bleaching in a shorter time at temperatures higher than 90 Fahr. is being explored.

Preliminary results obtained in a study of the neutralizing and reducing treatment in the final stage of the bleaching process, indicate that with good mixing the reaction is completed in 1-2 hours, though there have been instances when a longer storage time resulted in a somewhat higher brightness. When sufficient sulphite cooking acid is added to the bleached pulp to lower the *p*H to the desired value, there is enough cooking acid present to complete the required reducing action.

The Bacteriological Examination of Paper

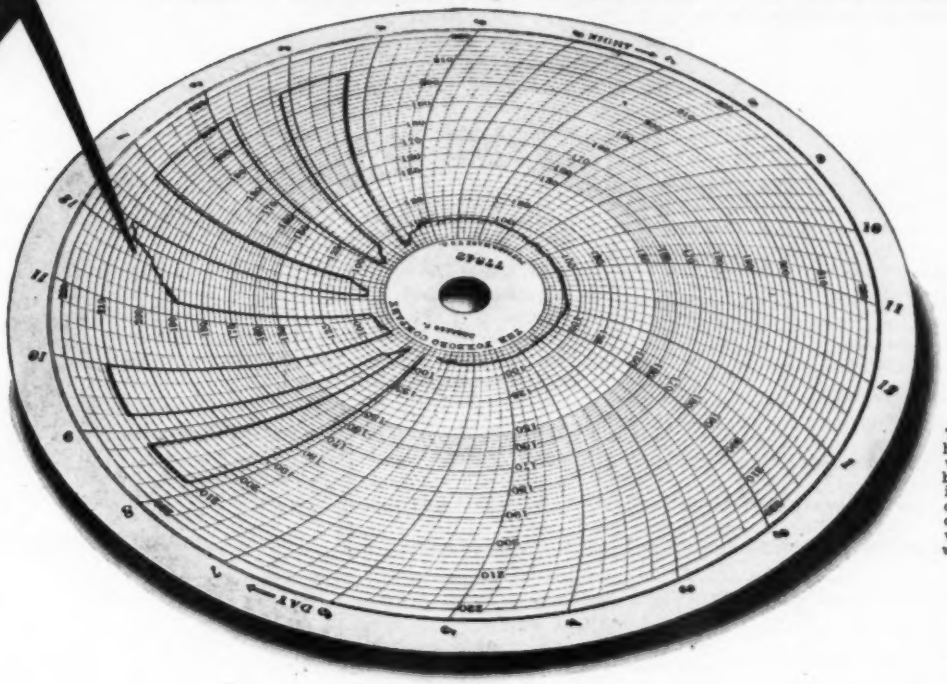
JOHN W. APPLING, Research Associate
The Institute of Paper Chemistry

The American Paper and Pulp Association has recognized the need for correlating activities in connection with bacteriological control in pulp and paper mills and for orienting scientific evidence by having initiated in 1939 a definite program of microbiological research at The Institute of Paper Chemistry. This program has included bacteriological surveys in paper mills and investigations at The Institute of Paper Chemistry for the purpose of obtaining facts related to bacteriological control in the mills. Bacteriological control is recognized and exercised by some mills primarily as a measure of economy and by others as an indispensable means of producing sanitary grades of paper. In order to determine the suitability of a given paper product for sanitary purposes, it is necessary to examine this product by bacteriological methods.

Because dairy products have been packaged in paper extensively for many years, it is not surprising to find that quite a variety of methods have been developed and recommended for the bacteriological examination of paper and paper containers

MARKS THE SPOT

where needless production losses occurred!



This chart shows how one batch "went wrong" because of boiler steam failure impossible to control at the process. Without the record, no one would have known why it happened!

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On any process employing temperature controllers, you'll get important *added protection* by installing controllers that keep written records of the temperature!

Foxboro Recording Temperature Controllers not only hold process temperatures exactly where you want them, but give you continuous graphic records to prove it. Even if external factors, such as steam failure or mechanical troubles, should "let you down", these automatic watchmen instantly mark it on the record... give you immediate opportunity to check the cause and correct it!

Foxboro On-Off Temperature Controllers are the type that has been proved best for over 65% of all control jobs... exactly suited to the characteristics of most processes. Simple, positive-acting, and calibrated in degrees for accurate direct setting.

Install Foxboro Recording Temperature Controllers and get continuous, accurate checks against needless losses. Write for Bulletin 225-2. **The Foxboro Company, 158 Neponset Avenue, Foxboro, Mass., U. S. A.** Also Montreal, Canada. Branches in principal cities.

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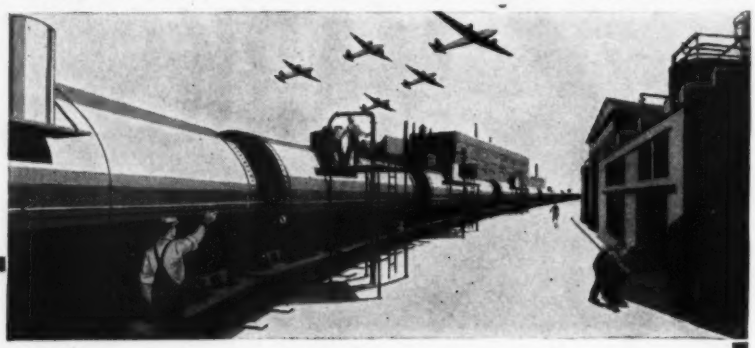
HOW AMERICAN INDUSTRY PRODUCES MORE, FASTER, BETTER—WITH BOWSER EXACT LIQUID CONTROL

SIX CARS OF BLENDED AVIATION OIL

...in one-eighth the time!



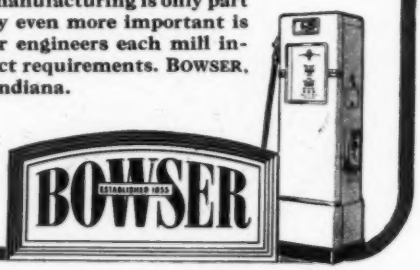
This is the story of another of those it-can't-be-done jobs that helped turn the tide of battle.

Wolf's Head Oil Refining Company, Oil City, Pa., got an emergency order for six cars of Navy aviation oil, a special blend that must pass rigid laboratory tests. It was a job that would, under ordinary methods, take over 40 hours.

With a Bowser Proportioner, pumping directly into the tank cars, Wolf's Head finished the work in a few minutes over *five hours*. And all tests showed perfect blending.

The superior performance of Bowser Liquid Control is a familiar story to men in the paper industry, for Bowser equipment is standard in virtually all paper mills in the United States and Canada, as well as in many in Europe. This equipment includes Bowser Oil Conditioners for steam turbines, pressure and gravity lubrication systems for Jordans, dryers, calender stacks and other equipment and lubricating oil filtration systems.

The soundness of Bowser designing and the precision of Bowser manufacturing is only part of the story. Possibly even more important is the fact that Bowser engineers each mill installation for its exact requirements. BOWSER, INC., Fort Wayne 5, Indiana.



THE NAME THAT MEANS **EXACT CONTROL** *OF LIQUIDS*

BUY WAR BONDS

used in the packaging of dairy products.

The results obtained thus far from the bacteriological examination of paper by the use of these various methods have been very informative to bacteriologists and to papermakers; however, the fundamental question of whether or not there is a public health hazard involved in the use of paper for the packaging of food has not really been answered. The paper industry is anxious to demonstrate conclusively that the use of the paper container represents a decided advance in sanitation and that there is no public health hazard involved in its proper use.

During the first two years of the program of microbiological research sponsored by the APPA, the main purpose was to assemble bacteriological data from different types of mills and at different times of the year. It seemed pertinent to ascertain the variation in bacterial content within the same mill during several days of operation, the variation from season to season and the variation from mill to mill. So much attention has been given to the bacterial content of the paperboard used in liquid food containers that it was logical to inquire into the bacteriological condition of the mills producing such paperboard.

Sampling techniques were carefully considered for all types of samples. One technique was finally adopted for all water samples and mixtures of pulp with water, whereas a different one was adopted for lap pulp and paper samples. In the case of the former, the sampling equipment for each sample consisted of a sterile glass stoppered bottle whose top was protected by a paper cover and a sterile cylindrical metallic scoop designed to enter the mouth of the bottle and protected by a paper wrapper. Two persons were required to take the sample, one opening the bottle at the proper time and the other transferring the liquid sample to the bottle by means of the scoop. The technique for sampling lap pulp and paper required two sizes of sterile heavy kraft envelopes (a small one placed inside a larger one), a sterile knife for cutting, and a pair of sterile forceps. The person taking the sample had to cut it from a sheet of lap pulp or paperboard, or from a roll of paper and transfer it aseptically to the inner envelope, whereupon the outer envelope was sealed with tape. An attempt was also made to determine the bacterial content of the air at various points in the mill. This was done by the Well's air centrifuge, by means of which the microbial content of 10 cubic feet of air was determined. This technique was used in five different mills.

The number and location of sampling stations naturally varied from mill to mill, however, all points at which changes in bacterial content might be expected were finally selected. In a general way, the samples included: (1) untreated fresh (raw) water, (2) treated fresh water, (3) lap pulps, (4) slush pulp, (5) pulp from save-alls, (6) sizing, (7) stock ready to leave beaters, (8) stock from machine chests, (9) stock leaving jordans, (10) white water, (11) stock from headbox (and/or vats), (12) water used at calender stack and (13) paper at the dry end. Each survey gave a set of samples varying in number from 12 to 18 depending upon the mill. This set of samples was transported to the bacteriological laboratory where they were examined within six hours from the time they were collected.

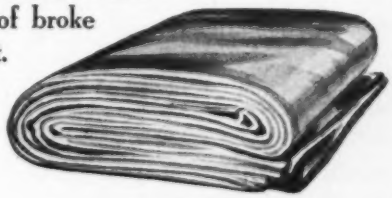
Bacteriological surveys have been made in 12 different paper mills. Most of them manufactured grades of paper and/or board used in food packaging. Five of the 12 were board mills. Geographically, seven were located in the middle west and five in the eastern part of the United States. The bacteriological examination was usually made at the paper mill by the use of equipment shipped to it from The Institute of Paper Chemistry.

The bacteriological examination of the collected samples consisted of the following: (1) plating according to procedures subsequently incorporated into TAPPI standards T-449 sm 40 (Technical Association of the Pulp and Paper Industry, *Paper Trade J.* 111, no. 15:27-30, 1940); (2) determining whether or not each sample contained coliform bacteria by the use of Bacto-Brilliant green bile cloth; and (3) differentiating the coliform bacteria found into fecal and nonfecal types by methods outlined in "Standard Methods of Water Analysis" (8th edition) (American Public Health Association and American Water Works Association, Standard Methods of Water Analysis, 8th Ed., 1936).

How much WATER to a TON of PAPER?

The convenient formula of 100 to 1 does not begin to tell the story. Rivers and lakes of water float the logs from the forests. Millponds carry them to the conveyors at barking mills. They are ground on millstones under streams of water or reduced to chips and converted into pulp in huge digesters filled with water and chemicals. The pulp is rinsed in water before being dried and lapped. It is again mixed with water and flowed onto the Fourdrinier wires.

At this point the process of separating the fibers from the water becomes more complicated and more exacting. And here is where Hamilton Felts enter the picture. By removing the water quickly and retaining the fiber in uniform distribution, Hamilton Felts permit the machines to be operated at higher speeds and give better formation to the sheets. They reduce the amount of steam required at the drier rolls and the amount of broke in the finished product.



From the thinnest tissue to the heaviest board there is a Hamilton Felt that will do your work better, faster and at lower cost.

SHULER & BENNINGHOFEN, HAMILTON, OHIO

Miami Woolen Mills

Hamilton Felts

Established 1858

The data in Table II are given as a typical set from one survey in order to illustrate the method used and to give an idea of the variation from one sampling point to another within the same mill. The untreated fresh water of a river was filtered and chlorinated to maintain a residual of 0.2 parts per million of chlorine. No chemical disinfectant was being used in the white water system at the time this survey was made. The general effect of the treated fresh water upon the bacterial content of the mill system was to lower it, as the data clearly show. An increase in the bacterial content of the tray water and white water, as compared with the stock in the headbox, clearly shows the ability of bacteria to multiply in the mill system, unless conditions are made unfavorable for them to do so. The bactericidal effect of the dryer rolls is also clearly shown by these data. Assuming a moisture content of 70 per cent for the wet web entering the dryers and 5 per cent for that of the paper at the dry end of the machine, there was a reduction in bacterial content of approximately 98 per cent in passing through the dryer section.

The control of microorganisms, particularly the bacteria and fungi (the more commonly occurring and colored forms of which are called molds), may be accomplished by the close co-ordination of a number of factors. Some of the latter are inherent to the pulp and papermaking processes, whereas others may be considered as artificial, although none-the-less necessary. Among the inherent factors which may be useful in bacteriological control are the following: (1) chemical pulping of wood, (2) bleaching operation, (3) moist heat in dryer rolls, (4) heat in wet system, and (5) *p*H of 5.0 or less. On the other hand, the important artificial factors of bacteriological control are: (1) good housekeeping, (2) chlorination (with or without ammonia) of untreated fresh water, (3) chlorination (with or without ammonia) of recirculated white water, and (4) addition of other suitable chemical disinfectants at the beater or elsewhere.

In discussing the inherent factors by means of which bacteriological control has been achieved, the most bactericidal operations in papermaking are the chemical pulping of wood and the bleaching operation. No living organisms are able to survive either process; however, not infrequently the pulps leaving the digester or the bleacher, as the case may be, are quickly contaminated with large numbers of microorganisms which are present in the wash water. With proper attention to the bacteriological quality of the white water, practically sterile unbleached pulp can be obtained from the pulping operation and sterile chemical pulp can be obtained from the bleaching operation. The lethal effect of heat upon microorganisms is extremely pronounced in the dryer section of the paper machine in which a reduction of 98-99 per cent of bacteria is commonly experienced. In some glassine mills, it has been observed that the temperature of the stock in the wet system was usually higher than 60 C. It may be interesting to note that the method most commonly used for pasteurizing milk requires that the milk be held at 61.8 C. (143 Fahr.) for 30 minutes. In other words, the temperature of the stock of these glassine mills is as high or higher than that required for the pasteurization of milk.

TABLE II—Bacteriological Data from a single survey made in a Specialty Mill (No. 11) on August 28, 1940.

Sample	Bacterial Count
1. Untreated fresh water	125,000/cc.
2. Treated fresh water*	2/cc.
3. Washed, partly bleached pulp.	120,000/gm.
4. Sizing	364,000/gm.
5. Stock ready to leave beaters	5,300/gm.
6. Stock leaving jordans	4,500/cc.
7. Stock in headbox	6,200/cc.
8. Tray water	20,000/cc.
9. White water (entering beaters)	66,500/cc.
10. Wet web entering dryers	6,300/gm.
11. Paper (37 lb.)	390/gm.

(*) 0.2 ppm of chlorine maintained, no untreated fresh water used in this paper mill.

Among the artificial means for achieving bacteriological control in a paper mill, one of the most significant is that of good housekeeping. Without this many other conditions, which might otherwise aid in bacteriological control, can be largely nullified. With it, in some cases, very little attention need be given to the use of chemical disinfectants. The use of chlorine (with or without ammonia) for untreated fresh water and for recirculated white water has been established by many mills as the most effective means of bacteriological control through the addition of chemical disinfectants. Chlorine is not only the cheapest disinfectant, but it is usually the most effective one. The use of other commercial chemical disinfectants may supplement the use of chlorine. The latter are particularly important in groundwood mills and in paper mills which use large amounts of groundwood in their furnish. This artificial means of bacteriological control is often very important for slime control and for the protection of woolen felts from decay.

A number of board mills in this country have pioneered in the field of bacteriological control. They have long since come to the conclusion that bacteriological control pays good dividends in better production and better quality of papers.

Occasionally certain board mills have experienced inexplicable increases in the bacterial content of the paperboard. In such cases these increases have been sufficient to cause the board to fall below the specifications for use in paper milk containers. A part of the research program at The Institute of Paper Chemistry has been devoted to a study of the lethal effect of dryer rolls upon bacteria. This has been done (1) by inoculating the wet web of an experimental fourdrinier machine with known species of bacteria; (2) by determining the bacterial content of peel-off liners from four different types of paperboard and (3) by determining the heat resistance of five different cultures of spore-forming bacteria *in vitro* and in paperboard. Most of the results (Appling, J. W., and Shema, B. F., *Paper Trade J.* 114, no. 13:40-44, 1942) obtained from these studies were presented at the annual meeting of the Technical Association of the Pulp and Paper Industry in February, 1942.

The bacteriological work on the fourdrinier machine was completed during April, 1942, by studying the effect of the dryer rolls upon suspensions of known spore-forming bacteria. The results obtained point clearly to the following: (1) nonspore-forming bacteria (such as *Escherichia coli, Staphylococcus aureus, Serratia mercescens,* and *Aerobacter aerogenes*) can be present in extremely large numbers in the wet web leaving the press section and yet be completely destroyed by passing through the dryer section of the paper machine; (2) if correspondingly high concentrations of spore-forming bacteria (such as *Bacillus mycoides, Bacillus mycoides* var. *Bacillus megatherium, Bacillus megatherium* var., and *Bacillus* sp.) are introduced into the wet web leaving the press section, a very large number survive the dryer section and are found in the finished paper; (3) it appears that when small concentrations of *Bacillus mycoides* and *Bacillus mycoides* var. are introduced into the wet web, they also survive in rather large numbers. On the other hand, small concentrations of each of the other three species of spore-forming bacteria do not seem to survive the dryer section.

The bacteriological data obtained from a study of the peel-off liners in a certain board mill have been given in a previous publication (Appling, J. W., and Shema, B. F., *Paper Trade J.* 114, no. 13:40-44, 1942). In general, large numbers of bacteria were found in both top and bottom liners when these had been made from highly contaminated stock, such as waste paper. The dryer rolls did not have sufficient lethal effect to sterilize highly contaminated stock, although it was heated by direct contact with the rolls.

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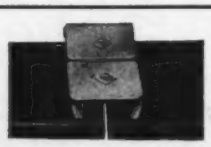
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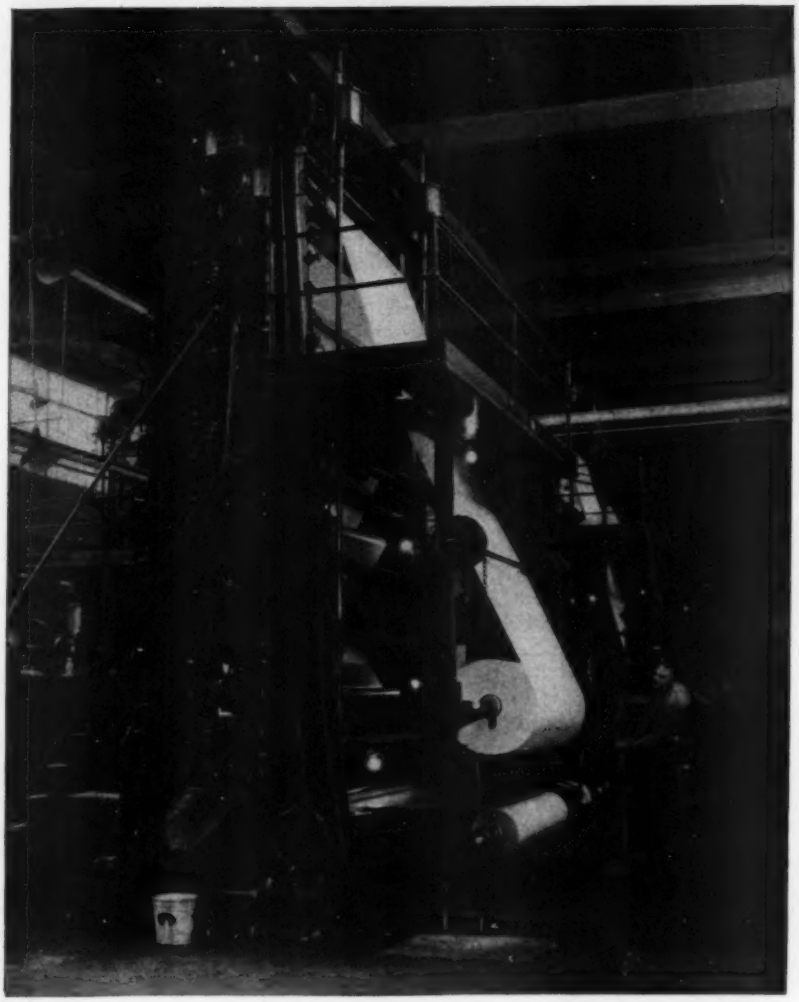

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The third approach to the study of the lethal effect of dryer rolls upon bacteria was that of determining the heat resistance of various spore-forming bacteria *in vitro* and in paperboard. Data from these studies were also given in a previous publication (Appling, J. W., and Shema, B. F., *Paper Trade J.* 114, no. 13:40-44, 1942). They point to the following conclusions: (1) spore-forming bacteria, such as *Bacillus mycoides* and *Bacillus megatherium* are capable of surviving a much longer period of exposure to moist heat in paperboard than *in vitro;* (2) the resistance of these bacteria to heat *in vitro* is often too great for one to expect sterility within the practical time limits used on the dryer rolls; (3) the resistance of these bacteria in paperboard is too great to obtain paperboard of bacterial content less than 250 per gram if relatively large numbers of these bacteria are present in the wet web; and (4) the heat resistance of a species of bacteria isolated from paperboard may be much greater than that of the normal species.

Thus, it seems clear that some other means of destroying spore-forming bacteria must be used in the mill system if paperboard of low bacterial content must be guaranteed. The lethal effect of the dryer rolls is too uncertain and too small to produce the desired result in all cases.

The author gratefully acknowledges the wholehearted co-operation of each mill whose bacteriological data have been used in this paper. Since the Biological Control Committee of the American Paper and Pulp Association and the author agree that complete anonymity of the mills must be preserved, the names of the co-operating mills cannot be given.

The author likewise gratefully acknowledges the invaluable assistance rendered by Dr. F. W. Tanner, Head of the Department of Bacteriology, University of Illinois, in the planning and in the execution of the work done during 1939-40.

The technical assistance of Messrs. W. H. Schmidt and R. F. DeLong, formerly on the staff of The Institute of Paper Chemistry, and that of B. F. Shema, now on leave of absence from the staff and serving in the armed forces of the nation, have been indispensable in carrying out the microbiological research reported in this paper.

Fluorescent Charts

PAUL A. SMITH, Lieut. Comdr.,
U. S. Coast and Geodetic Survey,
Chief Aeronautical Chart Branch

Fluorescent charts, tables, and other printed matter are used by Air Force pilots and bombardiers. Practically all charts are printed on offset lithographic presses, and many millions of charts must be produced annually (Smith, Paul A., *The Military Engineer,* July, 1943, pp. 357-361) (Donoghue, Lt. Col. John A., *The Military Engineer,* Sept., 1942, pp. 427-429). When the chart makers were confronted with this war requirement, the first and most obvious solution was fluorescent inks applied by offset press to ordinary white chart paper. Inks were produced which would fluoresce in colors similar to the conventional chart colors seen in daylight. A uniform light-yellow fluorescent base is usually applied to the paper in this process because the uncoated paper appears dark under ultraviolet light, and marginal notes and other printed material must be illuminated.

A review of the problem revealed that several methods for making fluorescent charts were possible:

1. Printing might be done with fluorescent inks on ordinary chart paper uncoated with fluorescence.

2. A thin coating of invisible fluorescent pigments could be applied to the paper by offset or rotary press or other means, and the charts then printed with ordinary lithographic inks, or with fluorescent inks, or a combination of both.

3. Maps and charts printed in the ordinary manner might be treated after printing with an invisible or transparent fluorescent coating.

4. Fluorescence could be made into the paper by the paper manufacturers in any of several processes.

5. A transparent fluorescent plastic envelope might be provided into which the chart could be slipped when in use.

The product obtained by the first three methods is subject to certain disadvantages, namely:

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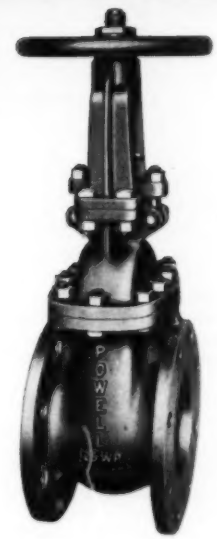

Fig. 2453—125-pound Stainless Steel O. S. & Y. Gate Valve, with flanged ends, outside screw rising stem threaded through bronze bushing in upper yoke arms, full flanged bolted bonnet and taper wedge solid disc. Shelf is provided on yoke for suspending gland out of stuffing box when renewing packing. Sizes, 2½" to 30", inclusive.

Fig. 1444—Large size 125-pound Iron Body Bronze Mounted Gate Valve, with flanged ends, outside screw rising stem threaded through bronze bushing in yoke arms, bolted flanged yoke, and taper wedge double disc. Sizes, 2" to 12", incl.

Fig. 1944 SW—This large size 125-pound Stainless Steel "Y" Valve is equipped with the Powell Patented Seat Wiper. Has flanged ends, outside screw rising stem threaded through bronze yoke bushing and full round bolted flanged yoke bonnet. Can be provided with clean-out pockets on special order. Sizes, 2½" to 12", inclusive.

The Powell Seat Wiper—Patented in 1935—is an ingenious internal regrinding device that assures tight closure of valves handling viscous or gelatinous media or suspensions in solution that precipitate over seat and disc faces. The disc is lowered to the seat by operating the large handwheel. The auxiliary (small) handwheel is operated back and forth to regrind or lap the seat and disc faces together, thereby clearing both seat and disc faces of any adhering material and insuring a metal to metal contact. Powell Globe, Angle and "Y" Valves can be equipped with the Patented Seat Wiper.

POWELL VALVES

1. They have low resistance to abrasion in use and handling.

2. Erasures on the surface of the chart during use or for purposes such as making hand corrections are impracticable without destruction of fluorescent coating.

3. More skillful operation of presses and careful attention with close inspection of prints for fluorescent color and brilliance as well as daylight inspection are required.

4. Uniformity of fluorescent color and brilliance is dependent upon individual operation. It would be especially hard to maintain on field presses.

5. Lower press speeds are required.

6. Special inks are necessary.

Advantages of fluorescent application to ordinary chart paper are:

1. No special paper is required, thus making fluorescent printing practicable with any available stocks.

2. Under ultraviolet a slightly greater range in color contrasts and values is possible.

It was found that any fluorescent overcoating of satisfactory stability and durability caused the chart to have a dull appearance. The transparent, plastic envelope required another piece of equipment for planes and pilot, and was therefore undesirable if the properties could be manufactured into the chart.

An ideal fluorescent paper offered the greatest advantages if it could be perfected because in this event it could be used with the least change in the ordinary chart printing processes. The nearest available approach to the ideal at the time was a thin coating or fluorescence applied to the conventional chart paper before printing, with the possible additional use of fluorescent inks as necessary. This method was, therefore, put into immediate use by the War Department. A fluorescent paper which would produce the desired effect with ordinary lithographic inks was obviously an attractive possibility. Inquiries from experts at the Government Printing Office, the National Museum, National Bureau of Standards, and the Geophysical Laboratory of the Carnegie Institution of Washington indicated that a satisfactory fluorescent paper might be produced in the quantities necessary within a few weeks. After several conferences with representatives of a number of paper manufacturers and the War Production Board, satisfactory preliminary samples of coated paper were produced by the industry and the fluorescent paper was put into use by the Coast and Geodetic Survey. Because of a limitation on quantities of fluorescent pigments, the coated paper seemed to be the most practicable. It had certain disadvantages, the main one being that it was to a slight degree subject to the same weakness of the printed-on fluorescence; that is, the fluorescence could be scraped off if hand corrections by knife erasures were made.

A new map paper, having unusual properties of wet strength, was under development for the War Department about the same time as the fluorescent paper was being tested. It was obviously desirable to use the same base stock specifications for the fluorescent paper as for the new chart paper without fluorescence. Preliminary mill runs were promising although costs were naturally higher than coated paper. Eventually, however, a satisfactory sheet was produced on identical specifications to the new high wet strength paper (War Department Specifications No. 43-139). Fluorescent brilliance and color were satisfactory to the Air Forces and this paper is now standard for Air Forces fluorescent charts.

Since aeronautical charts are generally used in daylight or under ordinary artificial light, care is taken that the addition of fluorescent properties does not impair their utility and legibility in daylight or white light.

A word may also be said about other fluorescent documents used by pilots and aircraft personnel under ultraviolet light. Tables, navigational data, and other printed matter have been produced by the Government Printing Office and others with fluorescent ink on black paper; by offset printing with a reversed plate on fluorescent paper using black ink; and by a process whereby letters and figures are printed with a letter press on black material.

At present, fluorescent charts are produced solely for war uses. The simplest and most satisfactory method yet found is the use of the fluorescent paper with ordinary printing inks and ordinary printing processes.

Fluorescent charts and other articles produced in fluorescence are spectacular in appearance. Obviously, future advances in this field may be expected as the phenomenon is applied to more and more utilitarian requirements, and the basic materials become more plentiful.

The Role of Alumina in the Mechanism of Rosin Sizing*

JOHN C. REDD, Development Engineer
The Mead Corporation

In the present study, an attempt is made to relate the influence of aluminum oxide on rosin sizing in terms of the colloidal characteristics of the alumina.

The pulp used in the sizing studies was obtained as a dry lap, unbleached sulphite. It was beaten to a freeness of 670, pressed to 20 per cent consistency, and re-suspended in softened water. It was pressed again, shredded, and stored in an air-tight container.

The sheets for the study of sizing efficiencies were prepared on a Noble-Wood sheet machine.

The sheets were tested for their sizing strength by use of the Currier size tester and by use of the fluorescent size tester (Van den Akker, J. A., Nolan, Philip, Breshfield, A. C., and Heller, H. F., *Paper Trade J.* 109, No. 21:33-42, 1939; *Tech. Assoc. Papers* 23:569-578, 1940).

The bursting strength of the sheets was determined by TAPPI Standard T 403m and the tearing strength by TAPPI Standard T 414 m-42. The sheets were aged for 48 hours at 100 C. and replaced in the humidity room for two days before repeating the strength tests.

Due to an unfortunate circumstance, the sheets which were aged in this manner for the purpose of testing the effect of aging on the sizing strength were accidentally charred by excessive heating. Although only a fraction of the sheets were capable of being tested, the indications are that sizing had improved with aging.

Ash determinations were made by igniting the accurately weighed sheets in a muffle furnace and weighing the residue. An ash determination was run on the un-

(*) A portion of a thesis submitted in partial fulfillment of the requirements of The Institute of Paper Chemistry for the degree of Doctor of Philosophy from Lawrence College, Appleton, Wis., May, 1942. This work was carried out under the direction of B. W. Rowland.

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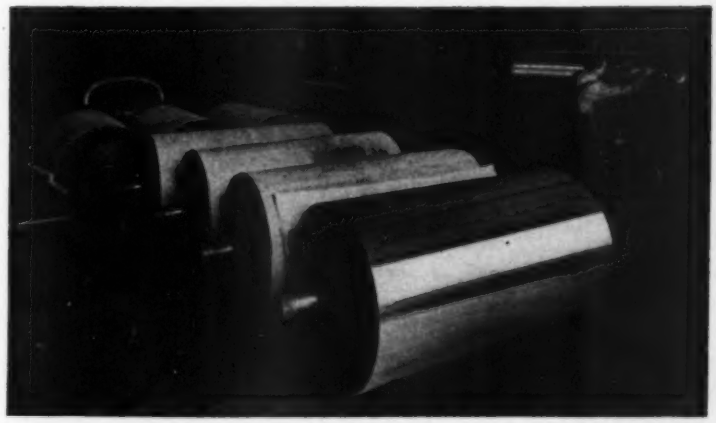

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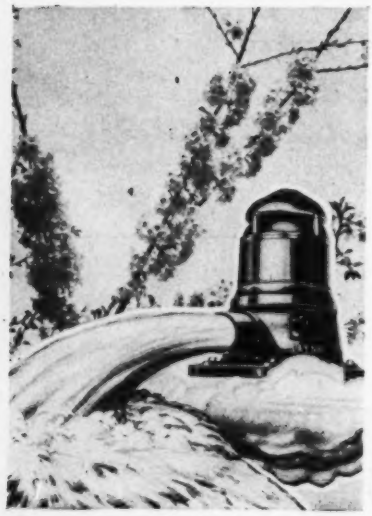

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treated pulp, and this amount was subtracted from the total ash of the treated sheets to give the percentage of ash.

In order to characterize precipitated aluminum hydroxide in a manner which would enable it to be studied with respect to its probable action in the sizing system, as well as to determine its electrostatic nature, the adsorptive power of alumina for arsenious oxide was chosen as the most suitable method, and was studied under various conditions. This procedure was used by Lockemann and Raucke (*Kolloid-Z.* 8:273-288, 1911) and adapted by Yoe (*J. Am. Chem. Soc.* 46:2390-2397, 1924) and Sen (*J. Phys. Chem.* 31:686-692, 1927).

The following conclusions were drawn from this work:

The adsorption of arsenious oxide from its solution by freshly precipitated alumina is rapid at first and decreases gradually to a constant value within 48 hours.

As the freshly precipitated alumina is allowed to age in its mother liquor, it loses its ability to adsorb arsenious oxide.

The degree of agitation which takes place during the precipitation of alumina does not affect its adsorptive power for arsenious oxide.

The faster the rate of addition of alkali solutions to alumina salt solutions, the greater the adsorptive power of the alumina.

The lower the temperature at which the alumina is precipitated, the greater its adsorptive power for arsenious oxide.

The higher the *p*H at which alumina is precipitated, the greater the adsorptive power for arsenious oxide.

Alumina which is precipitated in the presence of the sulphate ion has a smaller adsorptive power for arsenious oxide than that precipitated in the presence of the chloride ion.

Work on the peptization of precipitated alumina and the colloidal activity of the resulting sols led to the following conclusions:

The higher the temperature at which alumina is precipitated from its acid or basic salts, the less active the colloidal sol prepared from that alumina.

The lower the concentration of the solution of aluminum salts from which alumina is precipitated, the more active the colloidal sol prepared from that alumina.

When alumina is precipitated from aluminum sulphate, the higher *p*H of precipitation produces the more active colloidal sol of that alumina. However, if the alumina is precipitated from aluminum chloride, the higher *p*H of precipitation produces the less active colloidal sol of that alumina.

The lower the temperature of precipitation and the more dilute the solution from which the alumina is precipitated, the more voluminous and the bluer the precipitate.

The work has established a method by which activated alumina sols can be prepared.

The mechanism of the effect of alumina in the sizing action of pulp by rosin has never been fully described. It was hoped that, by applying to the sizing system some of the effects which have been observed for alumina and alumina sols, a better understanding of the action of this agent would be obtained.

The results of this work follow: Sizing is improved as the alum concentration is increased from 0.5 to 2.5 per cent. There is no improvement in sizing with the use of larger amounts of alum.

The effect of alum concentration on the strength properties is pronounced. The tear factor decreases as the concentration of alum increases, and the effect of aging develops very considerable losses in both burst and tear factors with increasing concentrations of alum.

Comparing these results with the results obtained on varying the *p*H at a constant alum concentration, it is shown that low *p*H values, in both cases, enhance the development of good sizing but have deleterious effects on the strength properties of the pulp. The effects on strength values are more apparent when the paper has been aged. It is apparent that it is difficult to attain maximum sizing with the use of alum without decreasing the *p*H to such an extent that the strength of the pulp is deteriorated. However, good sizing may be obtained if the acidity, which is obtained when alum is added, is partially neutralized by the addition of alkali. The *p*H cannot be reduced below seven, at which point there is a balance between the sizing developed and the effect of *p*H on the strength of the pulp.

It was presumed at the start of this work that, if alumina were the effective agent in the development of sizing in a pulp-size system where alum is used, and if a very active form of alumina could be prepared, a superior sizing action might be obtained. Two active alumina sols were prepared and their effect in the pulp-size system was studied.

The indications are that, whereas the sol alone contributes a sizing action to the handsheets, its effect is lost as the *p*H is increased; yet the amount of alumina adsorbed by the fibers is fairly constant over the entire *p*H range. This is true also in the case where rosin size is used in the system. This constancy of adsorption of the alumina on the pulp indicates that the activity of the colloidal alumina has not been altered by the change in *p*H, but the rosin size, at the higher *p*H values, has been transformed into a form which is incapable of being precipitated by the alumina. It is possible that the presence of the hydroxyl ions stabilizes the colloidal rosin particles so well that colloidal alumina will not cause their precipitation.

It is evident that, although active alumina sols may produce a sizing action in a rosin-pulp suspension, it is less effective than alum when based on the alumina content. Between 0.40 and 0.80 per cent alumina as alumina sol must be added to the pulp before sizing is obtained. These amounts are equivalent, in alumina content, to 2.61 and 5.22 per cent alum. The alumina sol has the advantage that it does not develop acidity, whereas the acidity developed by this much alum would be sufficient to cause a deterioration in the strength values of the paper. However, the results show that, if the acidity of the alum is controlled by the addition of alkali after the addition

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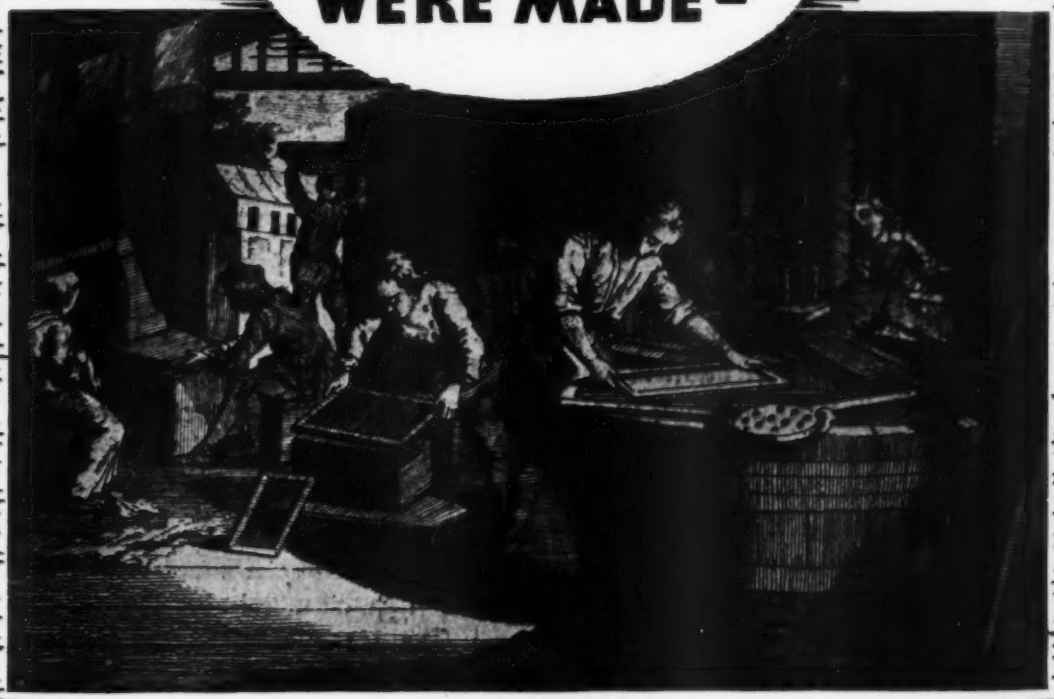

1778

PAPER SHORTAGE WASN'T A PROBLEM OF THE MASSES -

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The art of papermaking progressed until it developed into an industry that produced tons of paper faster and better than the early papermakers produced sheets.

Paper to be produced was done so by the use of felt layers, as the sheet was placed between the felt layers and water pressed out of it. As felts were important in 1778, so they are just as important today in the manufacture of paper. Since 1890 Appleton felts have progressed with production methods of the industry, year by year meeting all requirements of paper mill production—in 1944 the standard for paper mill felts.

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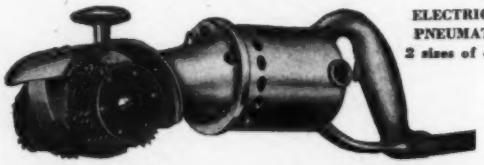

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of the size, alum is just as good a sizing agent as alumina sol, provided that the amount does not exceed 1 per cent.

If the sulphate ion is added to the sol before the addition of the rosin size, it will prevent the sol from producing any appreciable sizing effect. However, added in limited amounts to the system *after* the size has been added, it will accomplish a better sizing than if chloride ions were added. This may be attributed to the effectiveness of the sulphate ions for causing the precipitation of positively charged particles—that is, if the alumina and rosin form a positive complex, the sulphate ion would aid in accomplishing its precipitation on the fiber.

The fact that sulphate ions inactivate these colloidal sols indicates that this inactive colloidal state of alumina is undoubtedly not generally reached in sizing systems where alum is used. Furthermore, alumina, as precipitated from alum by caustic, is not as efficient an agent as alum for the development of sizing, even though alumina may be partially responsible for the development of sizing. Although no direct evidence has been offered in this investigation for the formation of aluminum abietate or aluminum resinates, the experimental evidence obtained indicates that the alumina which may form in a sizing system is not a sufficiently active agent to develop proper sizing in itself and, therefore, the sizing must be aided by some other constituent.

Because size suspensions are negatively charged, the presence of the sulphate ions, if present in great enough quantities, might possibly serve to stabilize this negative colloid. This was tested by adding excess sulphate ions (as sodium sulphate) to a size system. The results show that there was no appreciable decrease in the sizing when the concentration of sulphate ions was increased. However, the strength values show that the loss in both burst and tear factors, on aging, is very considerable if the concentration of the sodium sulphate is above 1 per cent. This demonstrates that if the sulphate ions are allowed to build up in a white water system where alum is used, a loss will occur in the strength of the paper.

The Alumina Content of Rosin-Free Handsheets in Relation to Tub Sizing*

B. W. ROWLAND[1]
and JAMES J. HARRISON[2]

Because of the complex nature of the reactions involved in the rosin sizing of paper, many theories have been proposed as to the effect of alumina in the system.

The effect of alumina alone on the sheet properties when added in the absence of rosin, fillers and other constituents has received little mention in the literature.

The pulp used in this investigation was a quick-cook bleached sulphite obtained in a wet lap form.

The starch used in the tub-sizing operation was a commercial tub-sizing starch of high quality. The 5 per cent starch size was prepared by making a thin paste in cold water, heating to 90 C. with stirring in a water bath and cooking for 15 minutes at this temperature. The starch solution was cooled to 48.9 C. and applied to the paper.

All the mechanical treatment of pulp was carried out with a British disintegrator as described in TAPPI Standard Method T 205m-40.

Freeness was measured with a self-lifting Schopper-Riegler tester.

Handsheets weighing 2,505 grams (oven-dry) were made on a Noble and Wood sheet-making machine.

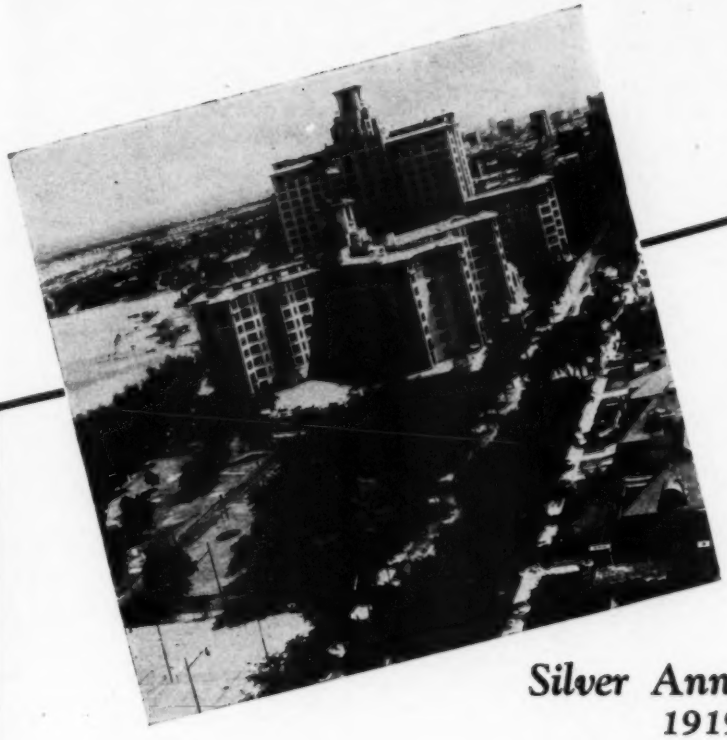
A constant weight was used on the press throughout the handsheet making.

The dryer was set at a suitable temperature (approximately 105 C.) and this temperature and the speed of rotation were maintained constant through the work. The sheets were conditioned overnight at 65 per cent relative humidity and 70 Fahr. before testing.

Tub sizing of sheets. The method consists in passing a continuous sheet through a temperature-controlled sizing bath at constant speed and removing the excess size between a pair of rubber press rolls

(*) A portion of a thesis submitted by the junior author in partial fulfillment of The Institute of Paper Chemistry for the degree of Master of Science from Lawrence College, Appleton, Wisconsin, June, 1941.

(1) Research Associate, The Institute of Paper Chemistry; (2) Ohio Boxboard Company.



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with adjustable pressure at the nip. The speed of the tub sizing can be regulated by changing the belt ratio of the pulley from the constant speed motor which drives the lower press roll.

The effects which the tub-sizing material caused were evaluated by physical strength tests. The reason for this is that, at the present time, there is no reliable method known for the quantitative determination of starch in paper. Furthermore, the actual quantities of starch in the paper would be of little value in a study of this nature because a chemical analysis would not show the distribution of starch. Therefore, it seemed best to evaluate the effect of the tub sizing by the actual changes in physical strength which occurred on treatment with the tub-sizing materials, even though such changes are only relative.

It was observed in preliminary studies that a definite resistance to water penetration was produced by treating paper with aluminum oxide sols made up from aluminum chloride using the common methods of preparation. It also appeared that, when the sheet was dried at 100 to 105 C. (a commonly used temperature for drying paper), the size resistance is increased. If the chloride is not removed completely before the paper is treated, it causes very rapid deterioration when the paper is heated. The sols made from amalgamated aluminum and aluminum sulphate were found to give no increase in resistance to the passage of water or ink.

An attempt was made to determine the electrostatic changes on the cellulose fibers.

Qualitative tests showed that the charge on the sheet became increasingly less negative as the amount of aluminum oxide retained in the sheet increased. When over 1.2 per cent of aluminum oxide were retained in the paper, the charge was reduced to a point where it was neutral or slightly positive.

From test data on tub sized sheets, it appears that the strength increment decreases as the amount of aluminum oxide retained in the sheet increases. The explanation may be the decrease in the negative charge on the sheet, making it more difficult for the starch particles to penetrate the sheet, or it may be more simply explained by the fact that the water resistance of the paper increases with the amount of aluminum oxide; for this reason, the degree of penetration into the sheet and the amount of starch retained is decreased.

Further test data show that there is very little loss in sizing on treating handsheets containing aluminum oxide with sodium sulphate. Water appears to have as much effect on the sizing of a sheet as does a sodium sulphate solution. However, when the sodium sulphate is added to the pulp suspension before the handsheet is made, it is apparent that the water resistance of the sheet is lost. An explanation of this effect of sodium sulphate may be that the zeta-potential of the hydrous alumina is lowered, as Weiser (*Inorganic Colloid Chemistry*, Vol. 2, especially chapter 3,) pointed out, and thus the sol becomes less absorbed by the fibers. The fact that as little as 1 per cent of sodium sulphate will almost eliminate the sizing effect of the aluminum oxide sol made from aluminum chloride is in accord with the results obtained in the preliminary experiments using an aluminum oxide sol made from aluminum sulphate.

The effect of the addition of alum upon the tub-sizing properties of paper also was studied.

Physical tests show that strength is lost as the amount of alum added to the pulp suspension increases. This observation agrees with the work presented by Ellern-Eichmann (*Papier-Fabr.* 31:197-201, 209-210, 222-226, 1933) and Keller, Simmonds, and Baird (*Paper Trade J.*, 112, No. 1:36-40, Jan. 2, 1941), who added alum under different conditions but nevertheless obtained strength losses as the amount of alum increased.

The tub-sizing strength increment is much greater for the sheets which had more alum present and started with lower physical tests. The explanation for the apparent taking up of more starch with increasing amounts of alum may be traced to the electrostatic condition of the fibers. As the negative electrostatic charge on the cellulose decreases, the starch particles are less repelled and can flow into the capillaries much as water does. When the charge approaches the neutral point, the starch is neither repelled nor flocked out but may flow in. If the negative charge is converted to a positive one, the starch would tend to plug rather than penetrate the sheet.

It remains for future work to determine how and to what extent these effects produced by alumina are modified by the presence of rosin size.

Properties of Sodium Peroxide Bleached Mechanical Pulp and Its Application in Paper Manufacture

LYMAN A. BEEMAN[1], FREDERICK C. GOODWILL[2], and RUSSELL SHEARER[3]

Sodium peroxide bleached mechanical pulp is a new pulp and should be considered as such. The chemical processing of this pulp has reached a development where it is well enough understood to bring its manufacture to a sound, commercial basis.

Oddly enough, the culmination of this development which has been reached during the years of World War II found its beginning in the years of World War I when the first steps were taken to improve groundwood pulp and introduce it into high grade printing papers to enhance printing capacity and quality.

During the intervening years, there have been many changes in grinding methods and control, many refinements in screening separation, and better understanding of pulp handling and preparation for paper machines. In spite of the continual improvement in quality and broadening of use, however, there has always been present the objectionable features of low brightness,

(1) Operating Manager, St. Regis Paper Company; (2) Technical Director, St. Regis Paper Company; (3) Resident Manager, Norfolk Mill, St. Regis Paper Company.

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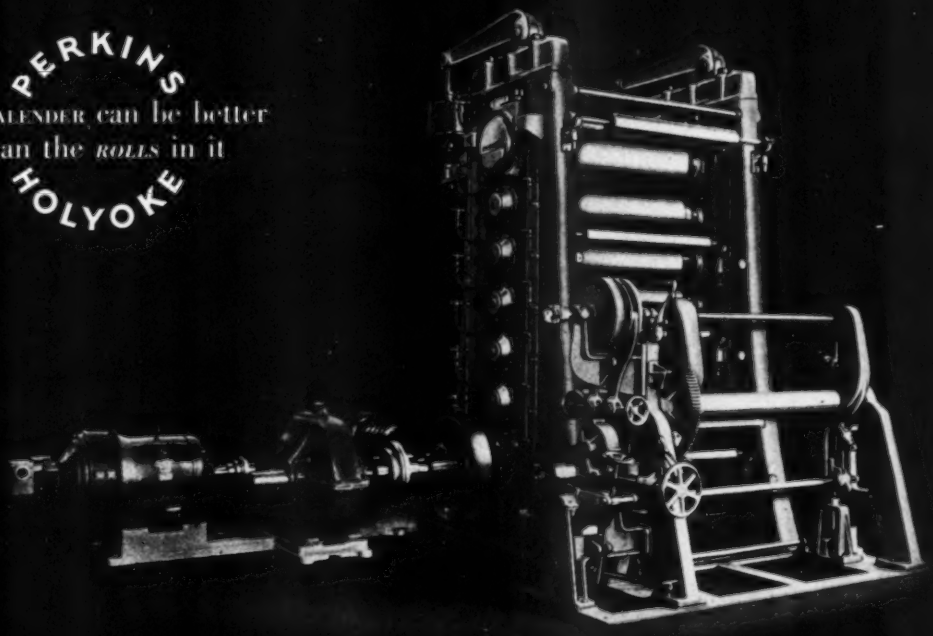

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harshness and lack of permanence as compared to some of the other pulps. The sodium peroxide treatment eliminates these objectionable features in one stroke.

The intelligent pulp maker will immediately perceive that many of the fundamental properties of the finished pulp will still be dependent on the wood used, the mill pulping procedure, and operating control. The proper species and quality of wood must be selected, it must be seasoned to the right moisture content, well cleaned and carefully ground with modern and close control of temperature and stone surface to give the desired properties as measured in bulk, freeness, strength and opacity. Bleaching does not seem to change the pulp, or at least does not change it much in these properties.

Improvement in color is, of course, the most important change and brings the pulp into competitive range in brightness with the bleached chemical pulps at a G. E. brightness reading of 70 and over depending on amount of peroxide used, color of the raw pulp and other factors. The effect of this increased brightness in pulp on the color of groundwood papers is accentuated because of the opaqueness and covering power as compared to bleached sulphite, sulphate or soda. In appearance, papers made from bleached groundwood show greater increases in brightness than would be expected from averaging the brightness readings of the pulps.

One of the most interesting points in the improvement in color is its continuation in improvement over the paper machine rather than stopping when the pulp reaches the stage where it is furnished in the beater room. In normal operation, this increase is enough to offset the usual loss in brightness over the machine due to fresh water use, reversion of chemical pulps or other causes.

Early in the operation of commercial bleaching, a study was started on color stability as measured by the G. E. Brightness Tester, but due to the war the work was discontinued and the results are inconclusive.

The working properties of groundwood pulps have always been recognized as excellent because of their high rate of drainage. Even though the fibers may be fine, the drainage is comparatively rapid, making it possible on the fourdrinier to produce a good close formation at high speeds. The introduction of small amounts such as twenty to thirty per cent make a surprising improvement in the ability to carry water on the wire and to handle in the wet presses. Bleaching softens and mellows the pulp (somewhat like chlorine bleaching on chemical pulps) and increases the drainage rate.

The brightness of a paper containing 70 per cent sodium peroxide bleached groundwood dropped very little (from 67.2—66.4) when kept in an office file for a little over two years. The Bureau of Standards has published preliminary data showing that, on exposure to light, peroxide bleached groundwood paper deteriorates about one half as rapidly as newsprint.

The softening and mellowing is an intangible thing but a papermaker who works with unbleached and bleached sulphite will understand the change because it is parallel. In the finished paper this quality gives a smoother, more velvety feel and eliminates the objectionable harshness sometimes noticeable in unbleached groundwood sheets.

It is rather a peculiar thing to find the freeness of the pulp itself does not seem to be changed while the drainage rate in the paper is increased.

In the storage of the pulp between the bleachery and the beater room, no special problems are encountered. No color reversion is noticeable in 72 hours at normal temperatures. With rotten wood, however, this stability seems to be much lower and might become a problem.

The furnishing and handling in the beater room follows the usual technique with the bleached groundwood isolated from any hydrating or treating action which may be necessary for the chemical pulps used in the furnish blend. Where reducing agents are added at the beater, the following order of furnish is preferred; draw in the bleached groundwood, introduce the required amount of reducing agent, add part of the alum (particularly if the dyestuff is sensitive to alkali) then follow with the dyestuff and balance of the alum before the balance of the furnish. The tungsten and molybdenum lakes, Ethyl Violet, Crocein Scarlet, and Rhodamine have been used with satisfactory results and without encountering any particular difficulty. The lake colors, of course, give the appearance of lending more permanence to the paper since they are very resistant in themselves to fading.

Unbleached sulphite will sometimes redden when used in combination with peroxide pulp, although the exact cause is not yet known. Poor washing of the sulphite plays some part. When this reddening occurs, allowance for it must be made in coloring the beater furnish since the red cast is not permanent but fades as the sheet passes over the paper-machine dryers.

The cleanliness of the bleached pulp is excellent. Many of the shives and fiber bundles and some of the wood dirt spots are softened so that they are broken up and disappear. In the pipe lines and equipment handling the pulp there is no slime growth and dirt from these sources is eliminated.

A pulp such as described obviously has wide application. Its only limitation is in fields where no short fibered pulp is usable because of extraordinary strength or wearing requirements or in the very small group where very long life is necessary. In the large volume fields of printing and converting it finds full utility and desirability.

The economic impact of bleached mechanical pulps in the post-war period will be felt throughout the paper industry. The introduction of this new papermaking fiber with all its implication of high quality and low cost may well be one of the most important forces shaping the economics of the years ahead.

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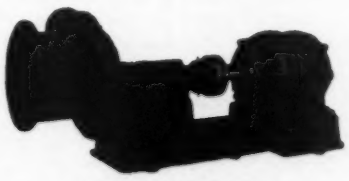

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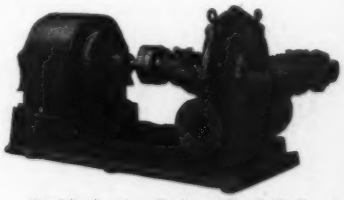

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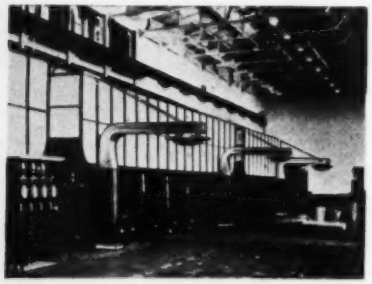
Summer Ventilation System for Machine Rooms

The J. O. Ross Engineering Corporation, 350 Madison Ave., New York 17, N. Y., has announced a system of summer ventilation for paper machine rooms. This system, according to the manufacturer, is believed to be the outstanding development in paper mill ventilation since the advent of the Briner economizer.



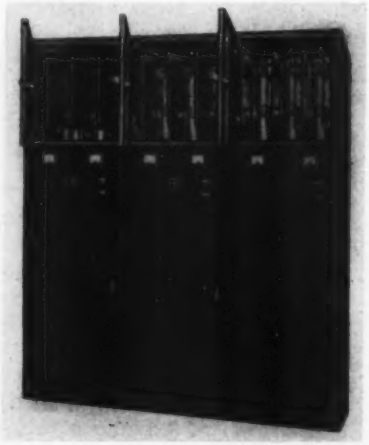
Basically, it consists of the introduction of fresh outside air, usually filtered, directly into the working zone of the machine room. The system permits the maintaining of an air balance, both winter and summer, within the mill, thus eliminating the need for opening windows during the summer with incident dirt and variable air movement.

Formerly, air was introduced through ducts, mainly under the roof, for the primary purpose of preventing roof condensation. The introduction of such air has been generally discontinued during the summer since no benefit is derived from it.

Summer comfort in the machine room is secured by the alternate duct arrangement of the summer ventilation system, the air being introduced through ducts rising through the floor from the machine room basement or by retractable ducts extending down into the working zone from the roof. Diffuser outlets are generally required to prevent too strong drafts; however, a definite air movement is desired by machine crews.

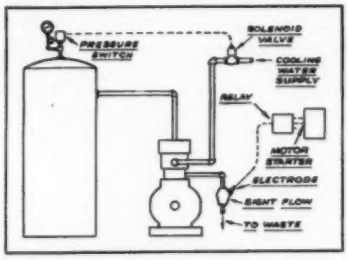
Control for Synchronous and Induction Motors

Electric Machinery Mfg. Company, Minneapolis 13, Minn., has announced the *E-M Hi-Fuse Control* for synchronous and induction motors. The unit combines starting service with short circuit protection through the use of split-cycle-operating, high-interrupting capacity power fuses. For synchronous motors, the control provides a polarized relay (E-M Polarized Field Control) which gives smoothness and maximum power in synchronizing the motor. The control can be furnished in live-front or dead-front, as well as in metal-enclosed type (illustrated).



Control for Water-Cooled Compressors

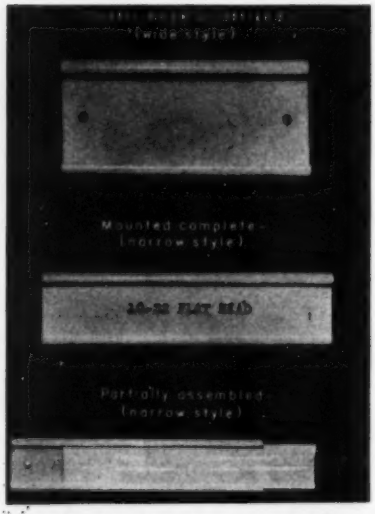
Johnson Corporation, Three Rivers, Mich., has developed an automatic control for use in protecting water-cooled compressors against the damaging overheating that results if operated without cooling water and in preventing unnecessary waste of water. The control, Type M, consists of a sight flow fitting, mounted in the water discharge pipe of the compressor, which serves as a holder for a metal electrode. When pressure in the receiver falls below the predetermined level, the pressure switch on receiver opens a solenoid controlled valve to admit cooling water to compressor. Compressor is not started until water flows through it and into the sight flow completing circuit with the electrode. If for any reason water supply fails, compressor will not be started; or, if operating, will be stopped immediately.



The control also is available for use on unloading compressors. In this application, the control, designated as Type U, insures that cooling water is flowing before compressor starts, and stops compressor or sounds warning alarm if water supply fails.

Stock Room Bin Card Holders

The Plastics Division, Hollywood Athletic Company, 211 East 7th Street, Los Angeles 14, California, has announced the availability of ivory plastic card holders for stock room bins. These holders are made in stock widths of ⅜ in., ⅞ in. and 1⅛ in.; and in stock lengths of 3 in., 4 in. and 5 in. Each holder consists of the plastic holder itself, an insert tab on which description of article may be typed, and a covering sheet of transparent plastic.



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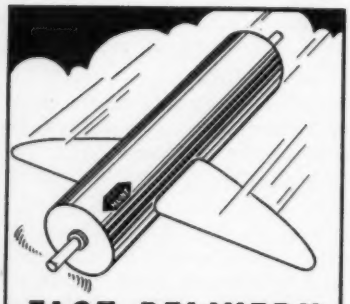

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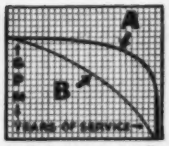

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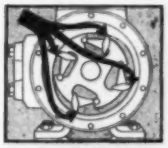

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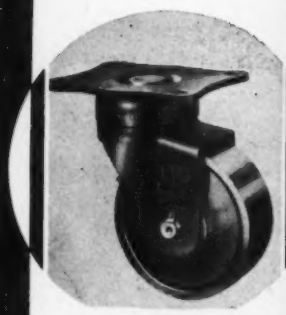

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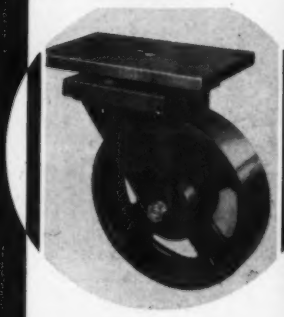

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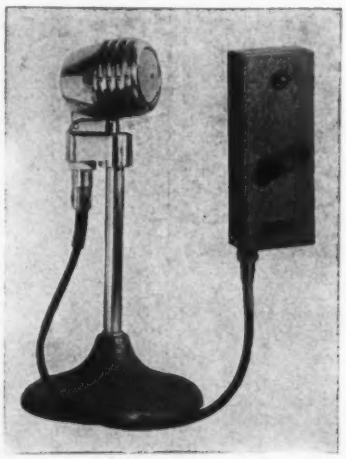
All live parts are metal-enclosed, various portions of the case being separately removable. The high voltage terminal compartment cover can be removed to facilitate connecting the transformer to the supply circuit.

Microphone Control Box with Busy Signal

Executone, Inc., 415 Lexington Ave., New York, N. Y., has announced a new Model P566 Relay and Busy Signal Control Box for co-ordinating the operations of multiple microphones and providing an instantaneous method of cutting in on central plant sound systems. Busy signal



light eliminates interruption from other microphones in the same system. Talk-switch prevents accidental broadcasting of unwanted sounds, provides automatic plate voltage relay control, and automatically cuts off music broadcasting when paging is desired.

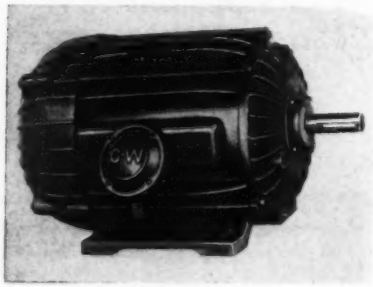
Suitable for wall mountings, the unit, housed in a gray crackle finished metal cabinet, is 6½ in. high, 2⅜ in. wide, and 1⅜ in. deep. Connections are made to terminal strips located inside the case.

Flexible Padding Glue

A cold, flexible padding glue has been announced by SO-Lo Works, Inc., Loveland, Ohio. This glue is applied with a water-moistened brush. According to the manufacturer, it is flexible when dry, and it will not crack or chip. The glue is available in quart and gallon lots.

Corrosion-Resistant Motor

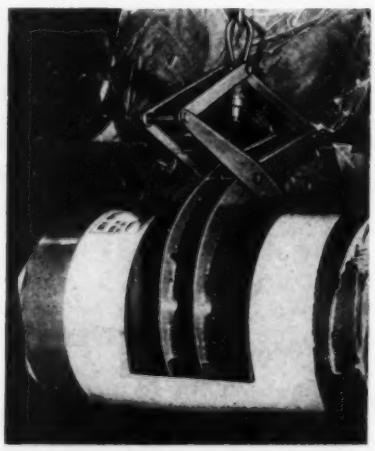
The Crocker-Wheeler Division of the Joshua Hendy Iron Works, Ampere, N. J., has announced a corrosion-resistant motor under the designation *Sealedpower*. This motor of the totally-enclosed, fan-cooled type without cooling ducts, is available in sizes from one to fifteen horsepower; and can be furnished for operation from any



polyphase power supply. The manufacturer states that the motor is suitable for operation in atmospheres containing injurious dusts, corrosive vapors or gases, and excessive moisture.

Tongs for Handling Paper Rolls

The Heppenstall Company, Pittsburgh, Pa., has developed tongs for lifting heavy rolls of paper. Built to any specifications, the tongs illustrated have a maximum



diameter of 38 in. and a lifting capacity of 3,000 lb. The tongs are of steel and the gripping surface is leather-lined. In use, the tongs are suspended from an overhead crane. They operate automatically.

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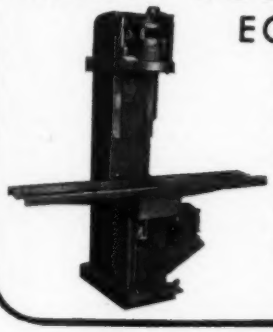

With the present pulpwood situation you have no choice except to try and produce as clean wood as possible. Murray wood cleaning equipment can help you now, as it has been helping paper mills for over half a century.

The Murray Knot drill shown here is just one of the machines developed to keep pace with the changes in the industry. It is especially designed for top working speed to reduce wood cleaning costs and yet increase production of a cleaner better sheet of paper.

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The Sherwin-Williams Co., well-known paint manufacturers, use Kraft wrapping paper and non-critical materials to manufacture unbreakable, leak-proof, fibre paint cans, following a process perfected by their own engineers.

The first step involves slitting rolls of Kraft wrapping paper into 4" wide strips, and winding these strips into compact, uniformly-wound rolls. This is done at high speed, 1,000 feet per minute—with CAMACHINE 10-11, illustrated.

The 4" wide rolls of Kraft converted on the CAMACHINE, are then transferred to a spiral tube-winding machine, shown in the illustration, producing a continuous tube. The tube is sawed off into yard lengths, for convenient handling, on a gang cutter, which cuts, for example, four tubes from the 36" length. Top and bottom rims are crimped on the tubes. Each can is then tested for leaks on a special machine and the job is done.

This is just one more instance of the way CAMACHINES help harassed production engineers save critical materials for the war effort. Further details on CAMACHINE 10-11 are yours for the asking.

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TECHNICAL DEVELOPMENTS

These abstracts are of the latest developments found in the American and foreign press.

Testing of Spinning Paper

Laboratory methods for the testing of kraft spinning paper with special reference to the changes that occur when the paper is moistened twisted and dried. Variations in strength over the norm in satisfactory paper were plus or minus 6%. Degree of pulping does not affect the expansion or the shrinkage of the sheet when it is moistened and dried. When the paper is moistened to 50% and suspended in air for drying, the strength properties decreased by 10%. After twisting, strips of various initial widths show a rupture when the length of the test specimen has been reduced to a definite point, regardless of the initial width of the strip. Strips were cut from paper that had been moistened to different water contents, from paper that had been conditioned to 10% moisture, and from samples that had been wet down on the paper machine. These were first twisted in a Schopper torsion apparatus and were then tested in a Schopper tensile strength tester. A paper moistened to 50% on the machine gives a yarn the strength of which is about the same as when the paper is wetted after leaving the machine to a 50% moisture content. This is also approximately true for lower moisture contents (e.g. 28-30%). As the number of twists per meter of paper increased there was a corresponding decrease in strength until about 90 twists per meter had been reached. Thereafter there was an increase. Data are also given showing the relationship between absorption and wet strength, as well as the effect of impregnating agents on the resistance of the paper to twisting. Björn N. S. Gregertsen. Svensk Papperstidn. 46, 337-42 (1943); cf. C. A. 38, 252 (1944).

The Study of Gloss

These are studies first undertaken by PATRA in 1939, which were later interrupted by the War. The author outlines the nature of the gloss problem showing its complexity. Gloss tends to vary according to the color of the incident light. Some papers are much glossier in red than in blue light. Shapes of the polar curves depend in large measure on the angle of incidence of the illuminating beam. The angle at which scattering is at a maximum is not always quite the same as the angle of specular reflection. A glossy surface is usually a smooth one, but there are exceptions to this. A smooth surface on the other hand is not always a glossy one. So the properties of smoothness and glossiness while related are certainly not identical. In general gloss depends upon the submicroscopic irregularities in a surface, whereas smoothness depends upon coarser irregularities that may be seen under the microscope. (This is the smoothness estimated by feel and by printing trials.) There are several commercial glossometers, which, while of value in control work, may or may not be working on theoretically sound principles, and so the results must be interpreted with caution. The original article includes a number of curves. V. G. W. Harrison. Patra J. 7, No. 2, 27-34 (1943).

Sodium Silicate and Aluminate in Sizing

In order to relieve the shortage of rosin and papermakers alum in France, the possibilities of resorting to mineral colloidal solutions were explored. These solutions included water glass and sodium aluminate. The work was carried out at the Grenoble School for Papermaking on a laboratory scale and later on large mill scale. Different furnishes were used and these were mixed in some cases with groundwood. If either of these two sizing agents was used separately, the results were unsatisfactory, and, evidently, of the two, water glass proved inferior to sodium aluminate. However, when the agents were used together, there was a marked improvement in the sizing effect. Despite this, it was essential

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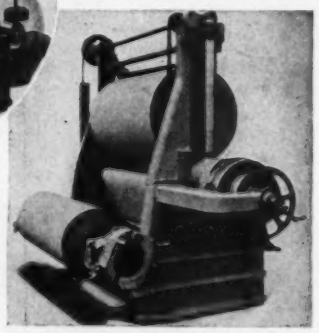

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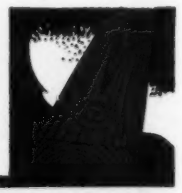

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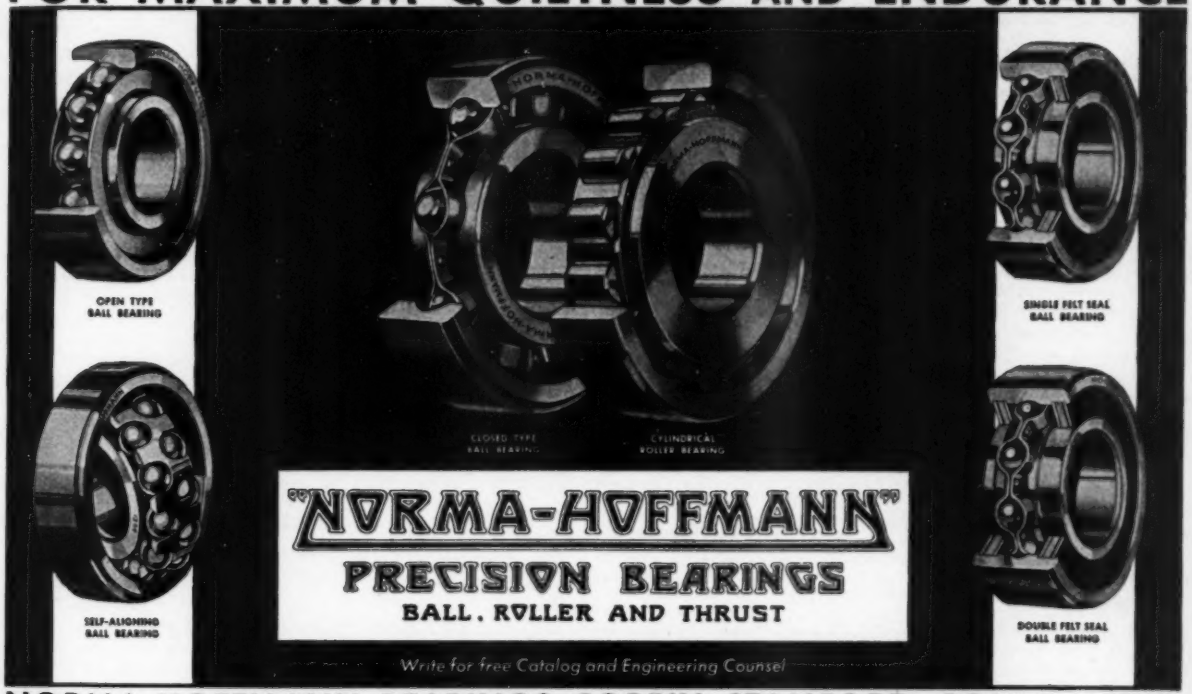
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to add small quantities of rosin size, provided sufficient size resistance for writing paper was required.

The following is the recommended optimum procedure: To start with, water and pulp are mixed in the beater and the *p*H brought to 4. First 1-2% of the silicate and then 1% of the aluminate solutions are added, and it is well to keep these solutions quite dilute. Care is taken that the mixing is very thorough before adding the next sizing solution. After the addition of the aluminate, the *p*H of the stock in the beater should be at the neutral point, (7), before the small amount of rosin size milk is introduced. To obtain a satisfactory effect, the quantity of rosin varies between 0.2 and 0.7%, depending on the furnish. This should give a satisfactory effect for writing paper. Before removal from the beater the *p*H should again be on the acid side, preferably 4.5-5, and this is brought about by the addition of papermakers alum, or preferably, dilute sulphuric or hydrochloric acid.

The availability of the various chemicals is stressed briefly, and the experimental data are given together with 17 references. M. Chêne and Marcel Aribert. Papier 44, 275-80 (Oct-Nov 1941), through B. I. P. C. June 1943.

Feed Yeast from Sulphite Wastes

Hot waste liquor from coniferous woods should be aerated at least one hour, neutralized with chalk (and lime) to *p*H 6.5 and allowed to settle for 24 hours. *Torula* (pseudo yeast) may be cultivated continuously without the addition of organic nitrogen. Foam which occurred during aeration was destroyed by a simple mechanical device without the use of chemical antifoaming agents. In the case of sulphite waste liquor from beechwood, one hour aeration at 90-100 deg., followed by neutralization with chalk sufficed to remove sulphites. However foaming appeared to be greater than with coniferous woods for the same aeration period. In fact, vats must permit the formation of such foam or must not be filled more than half-full. Production of these "yeasts" from other materials was suggested. H. Fink, R. Lechner, and R. Illig. Vorratspflege u Lebendsmittelforschung. 5,100 (1942). Through C. A. 37, 5501.

The Galactose Determination as Applied to Plant Mucilages

Among the mucilages that are of importance to the paper industry are the mannogalactans, which on hydrolysis give largely two sugars in varying amounts: mannose and galactose. A new method for determining galactose depends on the fermentation of the sugar by a yeast *Saccharomyces carlsbergensis*, which also ferments glucose, mannose, and fructose, but not the common pentose sugars, xylose, arabinose, or the uronic acids. Another yeast, *S. bayanus* ferments glucose, mannose and fructose, but not galactose (or the other compounds mentioned above). These differences serve as a means of assaying the galactose in hydrolyzates of the mucilages, and the determination involves the well known Munson-Walker copper reducing method. Details are given for carrying out the fermentations, and the analyses, and data are given for about ten mucilages including the well known locust bean gum. The method offers some advantages over the usual mucic acid method for galactose—Louis E. Wise and John W. Appling. Ind. Eng. Chem. Anal. Ed. 16, 28-32 (1944).

Ramie Wastes in Making Condenser Papers

In the processing of ramie stalks, there is a waste of some 80-85%. This can be used economically and technologically for the manufacture of condenser papers. The beating time is cut down 25% of that required when rag pulp is used. V. M. Chistov. Bumazhnaya Prom. 18, No. 9, 54 (1940), through C. A. 37, 5588 (1943).

Infrared in Industry

Near-infrared may be used in metal-baking operations and the equipment can also be adapted to use in the drying or preheating operations of the paper, textile, and plastics industries. P. H. Krupp. Products Finishing 8, No. 1, 14-18; 20; and 22 (1943); cf. C. A. 37, 514.

PAPERMAKING PATENTS

IN THE UNITED STATES — Compiled by James Atkins, Registered Patent Attorney

Inquiries should be addressed to James Atkins, Munsey Building, Washington 4, D. C.

Filter Paper and the Method of Its Manufacture and Use

Patent No. 2,314,548. Leslie A. McClintack, Worcester, Mass., assignor to Raymond H. Goodale, Worcester, Mass. No drawing. Application June 16, 1941. Serial No. 398,324. 9 Claims. (Cl. 23—253). 1. A dried filter paper for the determination of albumin in urine prepared to prevent deterioration when dried and stored, part of the paper being impregnated with ammonium sulphosalicylate and another part of the paper being impregnated with tartaric acid, said parts being separated by an unimpregnated zone but so close to each other that neither part can be completely wetted without wetting the other part.

Sizing and Coating Apparatus

Patent No. 2,316,531. Walter A. Nivling, Newton Center, Mass; Lyman E. Nivling and Owen C. Nivling administrators of said Walter A. Nivling, deceased. Application December 14, 1940. Serial No. 370,124. 9 Claims. (Cl. 91—50). 1. A coating machine for applying liquid to a moving web which comprises a roll running in contact with the web, a transfer roll in contact with said roll, a doctor roll spaced slightly from said transfer roll, means to drive said doctor roll positively and at a surface speed different from that of the transfer roll, and means for supplying liquid to the transfer roll.

Reciprocating Doctor for Papermaking and Allied Machines

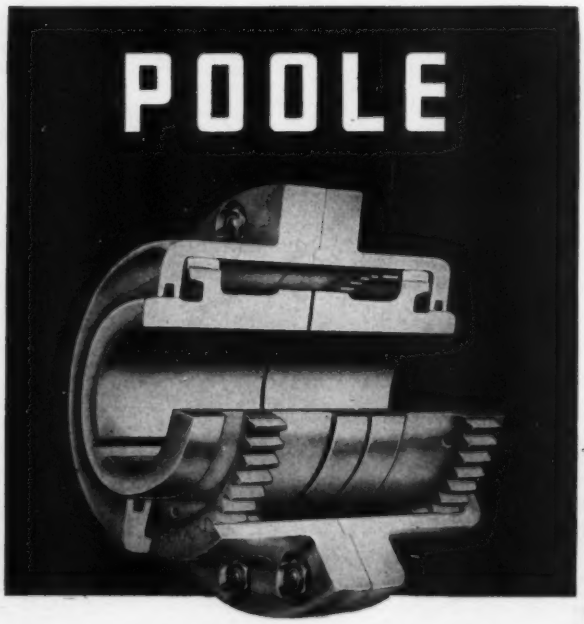
Patent No. 2,300,908. Arthur E. Broughton, Glens Falls, N. Y. Application May 24, 1939. Serial No. 275,394. 1 Claim. (Cl. 92—74). In a reciprocating doctor, an elongated, continuous, supporting head adapted to extend across a roller, said head having a longitudinal channel therein of rectangular shape in cross section and said channel being open at the front of the head, a light bar received within said channel, a doctor blade secured to said bar, said bar having a blade holding portion which projects through the opening in the forepart of said head, a doctor blade tensioner carried by said blade holding portion, anti-friction rollers carried by said bar and working within said channel and supporting said bar for reciprocation therein, and means connected to said bar for reciprocating said bar together with said blade and tensioner relative to said head.

Dandy Roll Construction

Patent No. 2,312,678. John A. Spencer, South Hadley Falls, Mass., assignor to H. M. Spencer, Inc., South Hadley Falls, Mass., a corporation of Massachusetts. Application May 5, 1941. Serial No. 391,929. 8 Claims. (Cl. 92—48). 1. A dandy roll comprising in combination, a support including space headers and a plurality of circumferentially spaced longitudinally extending members therebetween, and a cover including a plurality of longitudinally spaced rings on the longitudinally extending members of the support having circumferentially spaced openings adjacent their peripheries and a plurality of wire elements extending longitudinally of the support through said openings having opposite ends secured to said headers.

Structure and Arrangement of the Coacting Bars of Jordan Engines

Patent No. 2,306,672. Elmer C. Tucker, Holyoke, Mass., assignor to E. D. Jones & Sons Co., Pittsfield, Mass., a corporation of Massachusetts. Application August 31, 1938. Serial No. 227,794. 5 Claims. (Cl. 92—27). Fillings of bars for the tapering shell and plug of a Jordan engine



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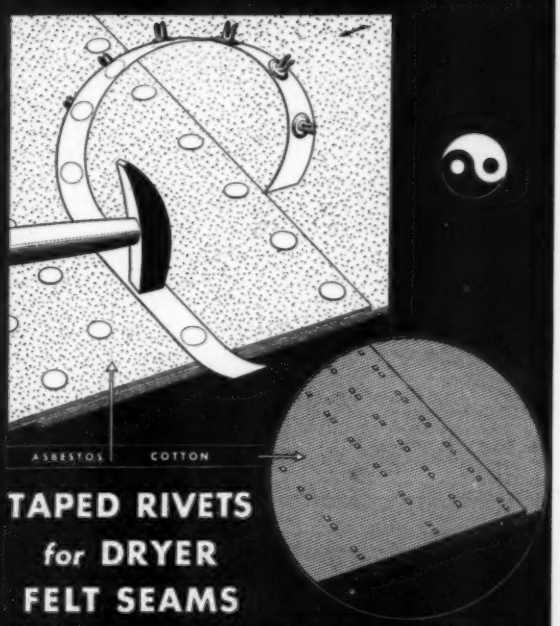

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which are relatively adjustable longitudinally to compensate for wear of the working faces of the bars comprising, longitudinally-extending spaced bars having working faces for forward and rear shell and plug sections with a greater number of bars in the rear than in said forward sections, the forward plug-section bars adapted before wearing to overlie rear portions of the forward shell-section bars to establish therewith a certain ratio of plug and shell bars and to overlie forward portions of rear shell-section bars to provide a certain zone of a certain length wherein there is an excess of shell bars over plug bars to establish a different ratio of bars, the working faces of said excess shell bars in said zone being removed on an incline outwardly and forwardly of the ends of the working faces of the rear plug-section bars and at such an angle as provides and maintains the said certain established ratio of co-acting working faces of plug and shell bars in said certain zone as obtains where the forward section plug and shell bars overlie one another when the working faces of the bars wear and the plug and shell are relatively longitudinally adjusted to compensate for said wear.

Method for Coating Paper

Patent No. 2,316,202. Edgar Warner, Dayton, Ohio, assignor to The Champion Paper and Fibre Company, Hamilton, Ohio, a corporation of Ohio. Application July 31, 1940. Serial No. 348,951. 8 Claims. (Cl. 117—102). 8. In the process of making cast surfaced coated paper by pressing a moving web of paper, by means of a press roll, against a moving casting surface with a layer of at least partially fluid coating material interposed therebetween, the improvement which comprises the continuous washing back of air bubbles and foreign matter from the nip where said pressing occurs, by means of a backwardly flowing pool of coating material maintained immediately in advance of said nip where it continuously washes over the moving web and casting surface, and the continuous washing of the press roll by means of a pool of water maintained in contact with said roll and out of contact with the paper web and the casting surface.

Method of Coating Paper

Patent No. 2,313,497. Harry J. Adrian, Stevens Point, Wis., assignor to Consolidated Water Power and Paper Company, Wisconsin Rapids, Wis., a corporation of Wisconsin. Application January 12, 1940, Serial No. 313,476. 2 Claims. (Cl. 92—40). 1. A method of coating paper of the type made on a Yankee paper machine to form a surface thereon which is uniformly smooth and suitable for the reception of printing which comprises, passing a newly formed wet web forwardly, mechanically removing a portion of the moisture therefrom, thereafter carrying one surface of the partially wet web into contact with a heated, imperforate, rotating surface, thereafter smoothing the other surface of said web by rolling pressure, coating said other surface with a mineral coating suspension while the web adheres to said rotating surface, drying said web and coating thereon while the web is carried by said rotating surface, maintaining the coated surface intact while the web is carried by said surface stripping said dry coated web from said rotating surface, and maintaining said web in substantially smooth condition while stripping the same from said surface.

Greaseproof Paper

Patent No. 2,308,692. Richard D. Freeman, Floyd C. Peterson and George K. Greminger, Jr., Midland, Mich., assignors to The Dow Chemical Company, Midland, Mich., a corporation of Michigan. No drawing. Application March 6, 1941. Serial No. 382,104. 2 Claims. (Cl. 117—157). The method for grease-proofing a paper sheet which includes: treating at least one surface of the sheet with an aqueous solution of aluminum cellulose glycollate and ammonia; and drying the treated sheet.

Manufacture of Grease-resistant Paper

Patent No. 2,304,287. Milton O. Schur, Berlin, N. H., assignor, by mesne assignments, to Reconstruction Finance Corporation, Washington, D. C., a corporation of the United States of America. Application March 23, 1939. Serial No. 263,664. 13 Claims. (Cl. 117—83). A paper sheet of high grease-resistance and low water-vapor penetrability, said sheet being primed on its surface with bentonite-binder composition, being filmed on such primed surface with zein, and being waxed over said zein.

New Catalogues and Publications

American Colloid Company, Chicago—A 12-page bulletin contains information about deinking old papers with the help of Bentonite. Its characteristics as compared with other clays are set forth, and formulas and general information about the deinking process are included. Request copies.

Association of Consulting and Chemical Engineers, Inc., 50 East 41st St., New York 17, N. Y.—Just off the press is the eighth edition of the classified directory containing 96 pages of information and guidance. The key sheet presents a record of the various services performed by the members, listing them as "specialized" and "qualified." Scope sheets offer statements from each member descriptive of his (or his organization's) qualifications and activities. The index provides in alphabetical order a membership list, company affiliations of members, and geographical location of members. Foreword and guide for the use of this directory are found on introductory pages, and excerpts from the code of ethics and by-laws are printed on the inside of front and back covers respectively. Copies available.

Baker-Raulang Company, 2168 West 25th St., Cleveland 13, Ohio—Baker Industrial Truck Division has just released a 20-page informative hand-book on trucks. It is printed in three colors and contains information on the handling of material by the use of power trucks, and also is designed to facilitate selection of the proper equipment for any set of requirements. Many of the special models which have been designed for the handling of unusual operations are illustrated. Ask for Catalogue No. 52.

Clark Tructractor Division of Clark Equipment, Battle Creek, Mich—Profusely illustrated and carrying specification data on every Clark Tructractor model, a new catalogue is released for distribution. This 72-page book fits comfortably into a vest pocket. The back cover is a tear-off inquiry form, to be used in requesting additional information or asking for the services of a field engineer. Ask for copy.

Johns-Manville, 22 East 40th St., New York—Ready for distribution is a 128-page manual for pulp and paper mills now using, or planning to use, pressure pipe in their plants. The manual is based on the company's experience with hundreds of above ground pipe installations in the pulp and paper industry. It is fully illustrated with photographs, detailed drawings and diagrams of pipe and couplings, and their assembly and installation. It explains how to make connections to fittings and equipment, how to handle, support and brace the material, and also contains complete reference tables of accssories. Request copies.

Leeds & Northrup Company, 4911 Stenton Ave., Philadelphia, Pa.—To show the recent installations of its full-metered system of combustion control, the company has issued a revised Metermax catalogue. This 37-page edition embodies basically the same engineering principles as were presented in the 1939 publication, and also includes special photographs showing features of design. This catalogue is of interest to anyone desiring information on more recent installations. Request catalogue N-01M-163.

The company also has issued a 23-page handbook entitled "Micromax Condensate-Purity Instruments for the Steam Plant," which is a revised edition of the publication issued recently. Embodying only minor changes in text, the catalog describes how condensate is sampled continuously by means of a conductivity cell, and its purity indicated and recorded automatically by means of a Micromax recording instrument. Copies gratis.

Wailes Dove-Hermiston Corporation, Westfield, N. J.—This company has issued a 4-page folder on Bitumastic protective coatings, which is designed to solve maintenance problems of the paper and pulp industry. It deals with the use of Bitumastic solutions for purposes of protecton, in avoiding corrosion, and its application to buried steel tanks, pipes, and the inside of water storage tanks, etc. A convenient postal card is attached for use in requesting information. Request copies.

Welding Engineers, Middletown, Ohio—A brief folder sets forth the complete welding servce offered by the company to paper mills. Illustrations depict the welding of various types of equipment. Request copies.

Smaller War Plants Corporation, Washington, D. C.—An index covers patents vested in the alien property custodian as of October, 1943. An accompanying sheet states that it is possible to secure from the Government the manufacturing rights to some of the best and most recent foreign inventions. Write Washington for complete information.

Books

The Blue Book of Southern Progress (1943) — This paper-covered reference book opens with a descriptive review of the South's progress during 1943. Succeeding pages are filled with facts and statistics of the region. They cover such a diversity of subjects as manufacturing, forest resources, agriculture, mineral production, construction, transportation, power, banking, foreign trade and area and population, a well as a listing of

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state officials and important commissions. Published by Manufacturers Record, Baltimore 3, Md., the book is priced at $1.00 a copy.

Emulsion Technology—This book contains the papers presented at the second symposium held by the British Section of the International Society of Leather Trades Chemists as well as contributions of three American specialists; namely, R. M. K. Cobb, M. P. Hofmann, and S. Werthan. The subjects treated in the book, presented in sequence, are as follows: On the Mechanism of Emulsification; the Fundamental Principles of Practical Emulsion Manufacture; The Use of Highly Dispersed Emulsions in the Treatment of Toxaemic Conditions; Emulsions in the Patent Literature; Industrial Emulsion Formulation; The Design of Emulsifying Machines; Effect of the Mode of Preparation on the Dispersion of Soap-Stabilized Emulsions; Problems Connected with the Preparation and Application of Emulsions Used in Agricultural Spraying; Some Observations on a Typical Food Emulsion; Emulsions and Emulsification in the Wool Textile Industry; The Stability of Emulsions in Thin Films; Emulsion Paints; Emulsions in the Leather Industry; Rubber Latex; and Some Physical Properties of Dispersions of Asphaltic Bitumen. The price of the book is $5.00 a copy; the publisher, The Chemical Publishing Co., Inc., 234 King Street, Brooklyn, New York.

Lange's Handbook of Chemistry (Fifth Edition)—This work is a volume of 2092 pages. The page size is 5⅝ in. x 7¾ in.; the cover, green Fabricoid. Its contents include 546 pages of new composition, as well as over 100 changes on other pages. The following tables are new to the fifth edition: Periodic Table (Deming); Flammable Liquids; Flame Temperatures; Plastics; Fluorescence of Chemicals, Minerals and Gems; and Water for Industrial Use. A number of other tables included in the previous edition have been rewritten or extended. Among the tables so treated are: Physical Constants of Organic Compounds, Organic Reagents for Inorganic Analysis; Common Hazardous Chemicals; Densities of Aqueous Solutions of Hydrochloric, Nitric, and Sulfuric Acids to Include Corresponding Values of Normality; Trade Names of Chemicals; and Two Hundred Year Calendar increased to a Three Hundred Year Calendar. Compiled primarily for the professional chemist or student of chemistry, the book likewise should be a helpful reference to other workers who at times require information on chemical products and on materials of construction. Compiled and edited by Norbert Adolph Lange, assisted by Gordon M. Forker, and with an appendix of mathematical tables and formulas by Richard Stevens Burington, the book is published by Handbook Publishers, Inc., Sandusky, Ohio. The price is $6.00 a copy.

Two New Literature Abstract Services—Interscience Publishers, Inc., 215 Fourth Ave., New York, N. Y., has announced two new literature services, one covering Natural and Synthetic Fibers, the other, Fats, Oils, Detergents. The service covering Natural and Synthetic Fibers, issued monthly, is in the form of a loose-leaf literature and patent digest. The publishers state that about 50 journals will be surveyed, and they estimate that the first 12 issues will amount to approximately 1,000 pages.

This service is to be edited by Dr. Milton Harris, Director of Research of the United States Textile Foundation and the Textile Research Institute, Washington, D. C., and Dr. Herman Mark, Polytechnic Institute of Brooklyn, New York. The subscription price of the service is $60.00 a year (binder $3.00 extra).

The service on Fats, Oils, Detergents, also issued monthly, likewise will be in loose-leaf form and will present abstracts of material from about 60 journals. The abstracts, according to publisher's estimate, will total approximately 800 pages the first twelve issues. The subscription price of this service is $36.00 a year (Binder, $3.00 extra).

You and Your Public—Verne Burnett, Vice President, General Foods Corporation, is the author of this volume. In his foreword, Mr. Burnett states that "This book is about you and your relations with your public." The work analyzes human responses and through illustrations and suggestions reveals how to appeal to other people. The author defines public relations, discusses the requirements of a public relations worker, and shows the place of surveys in a public relations program. He also relates how words play such an important part in public relations work, discusses various kinds of publicity, and briefly outlines some of the fundamentals helpful in organizing a public relations department. The price of the book is $2.50 a copy; the publisher, Harper & Brothers, 49 East 33rd St., New York, N. Y.

Your Business and Postwar Readjustment—Edited by Levertt S. Lyon, James M. Barker and Guenther Baumgart, this book consisting of three parts, has been written to aid executives in working out specific postwar problems. Part I treats of business problems and government policy in postwar readjustment. Part II discusses war problems affecting postwar operations. Part III furnishes a check list of questions, more than 50 pages of them, to guide operating executives in planning for their companies. Published by The University of Chicago Press, 5750 Ellis Ave., Chicago 37, Ill., the book is priced as follows: 1-9 copies, $1.00 each; 10-24 copies, 90c each; 25-99 copies, 85c each; 100 or more copies, 80c each.

CURRENT MARKET QUOTATIONS

RAGS (Domestic)

NEW RAGS

OPA ceiling prices in sales to consuming mills delivered buyer's usual receiving point, with brokers' allowance not in excess of 5 per cent.

	per cwt.
Blue Overalls	-5.50
Corduroy, Men's	-3.50
Corduroy, Ladies'	-3.00
Washables, No. 1	-3.00
Percales	-4.75
New Soft Blacks	-3.75
Light Prints, No. 1	-4.50
Khaki Cuttings—	
Bleachable	-4.25
Unbleachable	-3.50
New White Canvas	-6.50
New Mixed Blacks	-3.25
Canton Flannels, Bleached	-7.00
Shirt Cuttings—	
New White No. 1	-7.25
No. 1 White Headings	-7.25
White Shrunk	-5.00
Silesias No. 1	-5.75
New Unbleached	-7.50
Fancy	-3.50
Linen Cuttings—	
American	-5.00
White	-14.00
Grey	-14.00

RAGS (Domestic)

f. o. b. New York City

OLD RAGS

OPA ceiling prices in sales to consuming mills f. o. b. cars at points of shipment, with brokers' allowances of $1 to $2 a ton depending on the value of the grade involved.

Roofing—	per ton
No. 1	31.00
No. 2	29.00
No. 3 and No. 4	27.00
Twos and Blues—	
Repacked	44.00
Thirds and Blues—	
Repacked	44.00
Miscellaneous	36.00
Whites, No. 1—	
Repacked	76.00
Miscellaneous	64.00
Whites, No. 2—	
Repacked	58.00
Miscellaneous	53.00

RAGS (Foreign)

ex dock New York City

NEW RAGS — per cwt. — Nominal

New Dark Cuttings
New Mixed Cuttings
New Light Silesias
Light Flannelettes
Unbleached Cuttings
New White Cuttings
New Light Oxfords
New Light Prints

RAGS (Foreign)

ex dock New York City

OLD RAGS — per cwt. — Nominal

No. 1 White Linens
No. 2 White Linens
No. 3 White Linens
No. 4 White Linens
No. 1 White Cottons
No. 2 White Cottons
No. 3 White Cottons
No. 4 White Cottons
Extra Light Prints
Ord. Light Prints
Med. Light Prints
Dutch Blue Cottons
French Blue Cottons
French Blue Linens
Checks and Blues
Linsey Garments
Dark Cottons
Old Shopperies

ROPE and BAGGING

f. o. b. and ex dock New York City

Gunny No. 1—	per cwt.
Foreign	Nominal
Domestic	3.25 to 3.50
Wool Tares—	per cwt.
Light	3.25 to 3.50
Heavy	3.50 to 3.75
No. 1 Scrap Bagging	3.00 to 3.25
Manila Rope—	
No. 1 large	-*115.00
No. 1 small	-*105.00
Sisal Rope—	
No. 1 large	-*95 00
No. 1 small	-*80.00
New Burlap Cuttings	5.25 to 5.75
Jute Threads—	
Foreign (Nom.)	6.25 to 6.75
Domestic	5.50 to 6.00
Strings—	
No. 1 sisal	-*80.00
No. 2 sisal	-*60.00
Soft jute	5.00 to 5.50
Mixed	1.50 to 1.75

*OPA ceiling price per ton f. o. b. shipping point.

WASTE PAPER

OPA ceiling prices f. o. b. points of shipment, with brokers' allowance of 4 to 9 per cent.

Shavings—	per ton
White Env. Cuts, One-Cut	67.50-
Hard White Env. Cuts	62.50-
Hard White, No. 1	57.50-
Soft White, No. 1	50.00-
Soft White, One-Cut	57.50-
Soft White, Misc.	43.00-
Fly Leaf, No. 1	33.50-
Fly Leaf, Woody, No. 1	25.00-
No. 2 Mixed Col. Woody	18.00-
Flat Stock—	
Repacked No. 1 Heavy Books and Magazines	33.50-
Mixed Books	17.00-
Ledger Stock—	
No. 1 White	43 50-
No. 1 Mixed (Colored)	37.50-
Manilas—	
New Env. Cuttings	53.00-
New Env. Cuts, One-Cut	57.50-
Extra Manilas	37.00-
Manila Tab Cards, Free of Ground Wood	45.00-
Ground Wood Manila Tab Cards	27.00-
Kraft—	
Envelope Cuttings	65.00-
Mixed Env. or Bag Cuts	55.00-
Tripled Sorted No. 1 Brown	50.00-
New 100% Cor. Cuts	45.00-
No. 1 Old Assorted	35.00-
News—	
White Blank	33.00-
Overissue	17.00-
No. 1 Baled	15.00-
Old Corrugated Containers	23.00
New Corrugated Cuts	18.00-
Mill Wrappers	17.00-
Box Board Chips	14.50-
No. 1 Mixed Paper	14.00-

CHEMICALS

f. o. b. shipping point

Alum (Papermakers)—	
Lump, cwt.	4.25-
Ground, cwt.	4.00-
Powdered, cwt.	4.40-
Blanc Fixe—	
Pulp, bulk, ton	40.00 to 46.50
Dry, barrels, pound	60.00 to -
Bleaching Powder—	
Drums, cwt.	2.25 to 3.10
Casein (Domestic Standard)—	
20-30 mesh (bags), lb.	24.00 to 24.75
80-100 mesh (bags), lb.	—
Argentine, lb.	20.00—
China Clay—	
Domestic Filler	
Bulk (mine) ton	7.50 to 15.00
Domestic Coating	
Bulk (mine) ton	11.00 to 22.00
Imported (ship side)	
Bulk (lump) ton	15.00 to 26.00
Chlorine—	
Tank cars (wks) cwt.	2.00 to 2.25
Gelatine (silicin), lb.	.90 to .95
Glyc. (C.P.) drums, lb.	18.25 to 18.50
Litharge, powd., bbl., lb.	.09 to -
Rosin (Gum)—	
New York, per 100 lbs.	
E	5.30-
F	5.43-
G	5.43-
WW	7.37-
Rosin (Wood), carlots	4.18-
Salt Cake—	
Dom. bulk (wks) ton	15.00 to 16.00
Imp. bulks on dock— (Atl. ports) ton (Nom.)	20.00 to
Soda Ash—	
Bulk (works), cwt.	.90 to .95
Paper Bags, cwt.	1.05 to 1.35
Barrels, cwt.	1.05 to 1.35
Soda (Caustic)—	
Solid, drums, cwt.	2.30 -
Ground and flake, drums, cwt.	2.70 -
Sodium Silicate—	
60 deg., 55 gal. drums, (works) cwt.	1.65 to 2.05
40 deg., 35 gal. drums, (works) cwt.	.80 to 1.45
Starch—	
Pearl, 140 lb. bags, cwt.	3.72-
Pearl, barrels, cwt.	3.82-
Paper (Sp.) bags, cwt.	3.82-
barrels, cwt.	3.92-
Sulphur (crude)—	
(mine) bulk, long ton	16.00 to ——
Talc—	
Dom. 100 lb. bags (mine) ton	16.00 to 21.00
Imp. bulk, ton (Nom.)	—
Titanium Dioxide—	
Barium Pig., bbls., lb.	.05¾ to .06
Calcium Pig., bbls., lb.	.05 to .05¼
Zinc Sulphide, bbls., lb.	.5.60 to 5.85

WOOD PULP

OPA maximum prices applicable to wood pulp delivered to consumer mills located East of the Continental Divide exclusive of Denver, Colo. (West of the Continental Divide and in Denver, Colo., ceilings are $6 per ton lower):

Bleached softwood sulphite	86.00
Unbleached softwood sulphite	74.00
Bleached hardwood sulphite	83.50
Unbleached hardwood sulphite	71.50
Northern bleached sulphate	86.00
Southern bleached sulphate	79.00
Northern semi-bleached sulphate	82.00
Southern semi-bleached sulphate	75.00
Northern unbleached sulphate	73.00
Southern unbleached sulphate	63.50
Bleached soda	72.00
Unbleached soda	68.00
Groung wood pulp	50.00
Ground wood—paper machine dried and mutilated	53.00
Sulphite screenings	43.50
Sulphate screenings	38.00
Ground wood screenings	32.00
Northern unbleached sulphate sideruns	73.00
Southern unbleached sulphate sideruns	63.50
Standard news print sideruns	50.00

PAPER

f. o. b. New York City

Boards—	per ton
Binders	84.00-
Chip	48.00-
Chip, tube and can	50.00-
Chip, full-bending	52.50-
Chip, sgl. mla. lined	60.00-
Coated, white patent .016	80.00-
.020 and heavier	75.00-
Kraft liner	63.00-
News	48.00-

Book Papers—OPA base maximum prices per cwt. 4 cases or equivalent, f. o. b. mill with quantity, weight, manufacturing and other differentials allowed:

Uncoated (Untrimmed)

Book, White (M. F.)—	
A Grade E. F.	8.25
B Grade E. F.	7.80
C Grade E. F.	7.55
D Grade E. F.	7.30
E Grade E. F.	7.05
No. 2 Uncoated Offset 4 sides. White	8.45

Coated White (Trimmed 4 sides)

No. 1 Glossy	11.90
No. 2 Glossy	10.85
No. 3 Glossy	10.15
No. 4 Glossy	9.80
No. 5 Glossy	9.30
C2S Offset	10.40
C1S Litho (Varnish)	10.05
C1S Litho (Non-Varnish)	9.80

Writing Papers—OPA base maximum prices per cwt. on writing papers, f. o. b mill with zone, quantity, packing and other differentials allowed:

Rag Content Bond—	per cwt. 20 lb.	16 lb.
Extra 100% Rag	34.00	34.00
100% Rag	28.00	28.00
75% Rag	20.00	20.00
50% Rag	16.00	17.25
25% Rag	14.00	15.00

Rag Content Ledger—	per cwt. Zone 1
Extra 100% Rag	35.00
100% Rag	29.00
85% Rag	26.00
75% Rag	21.00
50% Rag	17.00
25% Rag	15.00

Sulphite Bond—	per cwt. 20 lb.	16 lb.
Air dry, watermarked	12.75	13.70
No. 1 (M. F.) watermarked	9.00	9.70
No. 2 (M. F.) watermarked	8.25	8.85
Plain (M. F.) unwatermarked	7.60	8.20

Sulphite Ledger—	per cwt. Zone 1
No. 1 (M. F.) watermarked	10.00
No. 2 (M. F.) watermarked	9.25
Plain (M. F.) unwatermarked	8.60

Glassine (f. o. b. mill)—	per cwt.
Embossed (25 lb. up)	13.75 to 14.25
Bleached (25 lb. up)	12.75 to 13.25
Unbleach. (25 lb. up)	11.50 to 12.00
Greaseproof—	
Bleach. (25 lb. up)	11.00 to 11.50
Unbleach. (25 lb. up)	10.00 to 10.50

News—OPA Ceilings	per ton
Rolls (Contract)	58.00
Rolls (Spot)	(nominal)
Sheets	66.00

Tissues (Carlots)—	per ream
White, No. 1	1.12½ to 1.20
White, No. 2	1.00-
Bleached Anti-Tarnish	1.15-
Colored	—
Anti-Tarnish Kraft	.70-
Manila	.90 to .95
Napkins, semi-crepe (12½ lb. to M shts.) per cs.	.60-
Napkins, full crepe and emb'sed (12½ lb. to M shts.) per cs.	.60-
Toilet, Bleached (M shts.) per cs.	5.65-
Toilet, Unbleached (M shts.) per cs.	4.25-

Towels—	per case
Bleached	3.20 to 3.75
Unbleached	2.80 to 3.05

Wrappings (Kraft)—	per cwt.
Super-Standard	5.25 to 7.65
No. 1 Wrapping	5.00 to 7.40
Standard Wrapping	4.75 to 7.15
Standard Bag	4.37½-

Wrappings (Sulphite and Bleached Kraft)— (Rolls, f. o. b. mill)

Bleached papers— M.F. & M.G. Waxing, 20 lb. (Carloads only)	per cwt. 7.25 to 7.50
(10,000 lbs.)	7.50 to 7.75
Drug wrapp. 35 lb.	7.00 to 7.25
Unbleached Papers—	
Com. Grd. Butch. 40 lb.	5.50 to 5.75
No. 1 Butchers	5.75 to 6.00
No. 1 Imit. Parch & Dry Fin. Groc. Sulphite 30 lb.	6.25 to 6.50
No. 2 Imit. Parch & Dry Fin. Groc. Sulphite 30 lb.	6.00 to 6.25
Steam Finish, 50 lb.	5.00 to 5.25
Water Finish, 40 lb.	5.50 to 5.75

Manilas—	
Envp. Mla., Sub. 16-40 (No. 1)	6.00 to 6.50
Envp. Mla., Sub. 16-28 (No. 2)	5.75 to 6.00
Envp. Mla. (Prices based on large sheets untrim'd ream-marked, in bdls.)	
Wrapp. Mla. 35 lb. up—	
No. 1	6.00 to 6.25
No. 2	5.75 to 6.00
M. G. Sulphite and Kraft (other than Waxing)	
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Grade B-20 lb.	6.75 to 7.00

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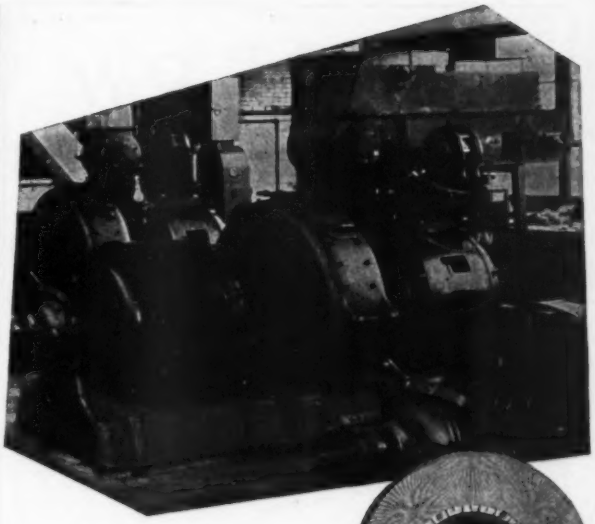

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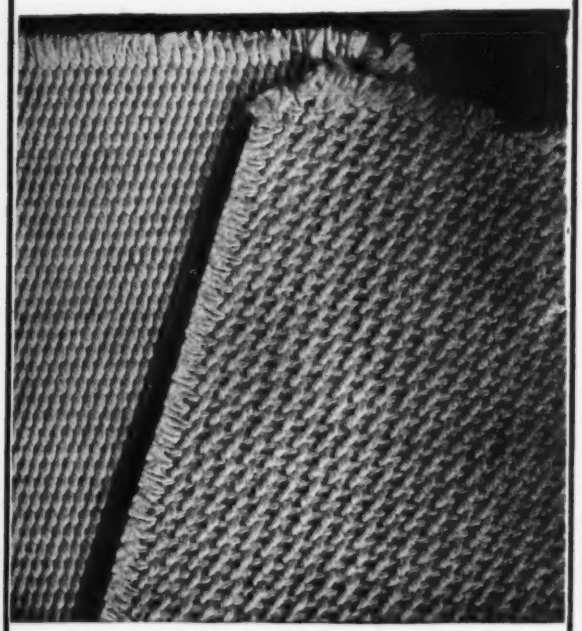

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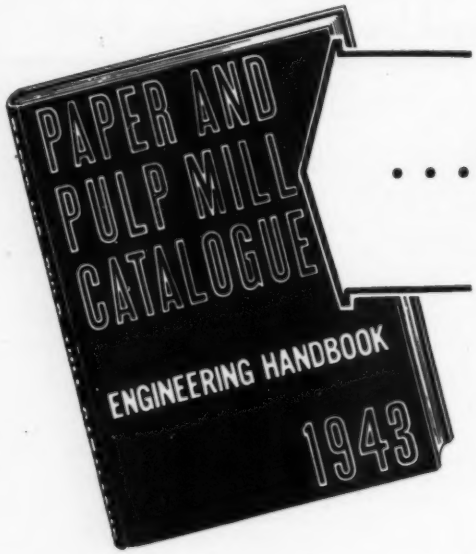

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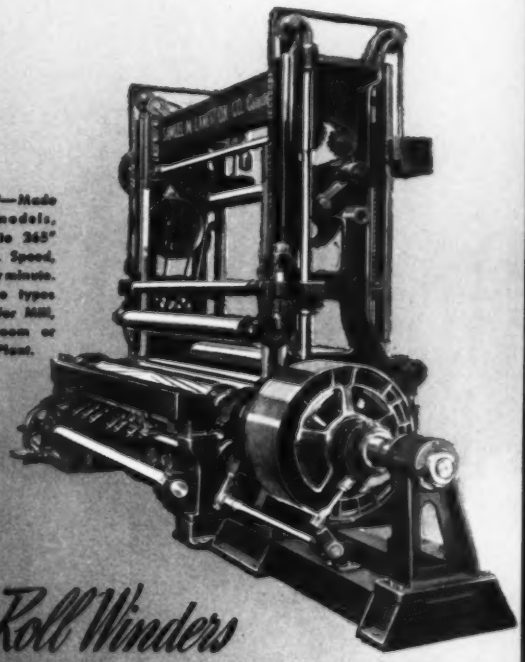

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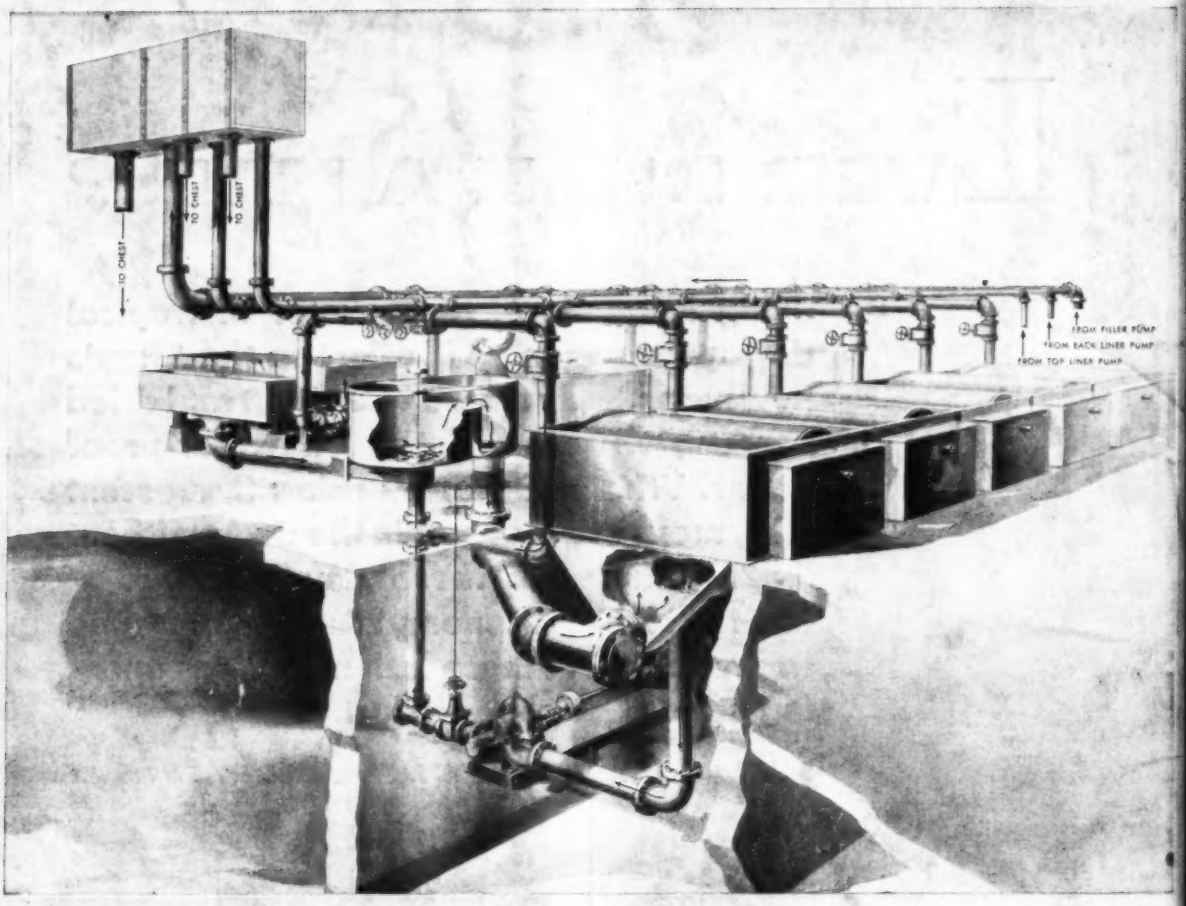

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